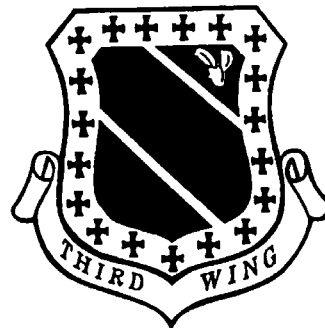


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*Final*

# **Environmental Assessment C-17 Beddown**

**Elmendorf Air Force Base, Alaska**



Prepared for  
**United States Air Force  
3rd Civil Engineer Squadron  
Elmendorf Air Force Base, Alaska**

September 2004

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## FINDING OF NO SIGNIFICANT IMPACT

**PROPOSED ACTION:** The Proposed Action would involve replacement of the existing C-130 cargo aircraft fleet with eight new C-17 aircraft at the U.S. Air Force's (USAF's) Elmendorf Air Force Base (EAFB), Alaska. The existing 18 C-130 aircraft would be assigned to military installations outside of Alaska. To continue to supply remote Department of Defense sites in Alaska and Canada, it is expected that four smaller cargo aircraft with characteristics similar to C-130 aircraft would continue to operate from Kulis Air National Guard Base or on a contract basis. The C-130 aircraft are scheduled to depart EAFB in 2006 and the C-17 aircraft are scheduled to arrive in 2007. The Proposed Action would consist of routine aircraft operations (both mission- and training-related) in the vicinity of EAFB, the construction and use of support facilities on EAFB, and an increase in the number of people needed to support all EAFB mission-related activities. New facilities would be constructed in a phased approach in an effort to minimize impacts to normal base operations. The proposed action includes construction of: (1) a Consolidated C-17 Support Complex (Dual Bay Hangar), (2) a C-17 Fuel Cell, (3) a C-17 Flight Simulator Facility, and (4) roads, utilities, and parking. Additions or alterations will be made to: (1) Hangar 18 and (2) the Survival Equipment Shop.

**PURPOSE AND NEED:** With proximity and access to the Pacific Rim area, Europe, and North America, EAFB's strategic location is of significant importance to global military operations. The installation's location is ideal for deploying aircraft, troops, and equipment around the world. The C-17 Globemaster III is a state-of-the-art, cargo-carrying aircraft and the USAF's choice for such deployment missions. USAF Alaska airlift capabilities would be brought to state-of-the-art standards and increased capacity through the addition of new C-17 aircraft. In addition, it is anticipated that the C-17 aircraft would play a major role in Fort Richardson's 172nd Stryker Brigade combat team, for which U.S. Army Alaska has completed an independent Environmental Impact Statement.

To comply with the National Environmental Policy Act (NEPA), as well as with other pertinent environmental requirements, the decision-making process for the Proposed Action includes the development of this environmental assessment (EA) for the proposed C-17 aircraft beddown, operation, and construction projects. This EA, based on the Environmental Impact Analysis Process, provides a thorough examination of all significant environmental issues pertinent to the Proposed Action and to the No Action Alternative (which, under NEPA, is always viable and must be evaluated). In doing so, this EA takes into consideration the recent and thorough environmental analyses conducted in the region of interest and incorporates them by reference where relevant.

### SUMMARY OF ANTICIPATED ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE PROPOSED ACTION:

**Geological Resources.** The site of the Proposed Action is an existing airfield with flat terrain. Since it is anticipated that there would be minimal excavation for footings, minimal site grading, and no surface water within the extent of the Proposed Action, no adverse impacts would be expected.

**Land Use.** The area is currently involved in the same type of activities as the Proposed Action. The Proposed Action would not adversely impact current activities in the area and would adhere to the land use recommendations presented in the installation's General Plan and its 50-year plan.

**Coastal Zone Management.** The C-17 beddown location is not within the 150 acres of shoreline that are within the coastal zone boundary managed by EAFB. Therefore, no impacts to coastal areas would be expected as a result of the Proposed Action.

### Biological Resources:

**Vegetation.** Since the area is already largely developed and paved, no additional adverse impact to floral communities would be expected.

**Wetlands.** No wetlands are within the Proposed Action area. Surface water runoff patterns would not change. Therefore, no downgradient wetlands would be affected.

**Wildlife.** The area is already developed. Temporary changes in urban wildlife behavior might result from additional or differing noise conditions during construction and operations. However, no long-term changes from existing conditions would be expected. In addition, the Cook Inlet beluga whales would not be exposed to noise levels different from current levels.

**Threatened and Endangered Species.** Since there are no known threatened or endangered species at EAFB, no adverse impacts would be expected.

**Other Protected Species.** It is not expected that bald eagles or marine mammals would be adversely impacted by the Proposed Action.

**Water Resources.** There are no streams, creeks, ponds, or lakes in the immediate construction area. Storm water quality would be protected by implementation of best management practices as specified in the EAFB's Storm Water Pollution Prevention Plan. The slight increase in impervious surface would not alter groundwater recharge or percolation. Therefore, downgradient streams, creeks, ponds, and lakes would not be directly impacted. Any initial construction impacts and longer term cumulative impacts would affect only the Cook Inlet.

**Air Quality.** There would be a slight increase (6 percent or less) in emissions from stationary sources due to increased space heating and C-17 touch-up painting. Emissions from mobile sources, including the increase in commuter traffic, would increase during construction and operation. However, it is not projected that increases would result in a non-attainment condition at EAFB, in the Municipality of Anchorage, or in the Anchorage Bowl. Additionally, since EAFB is over 100 kilometers from any Class I areas, the increased emissions of sulfur oxides and nitrogen oxides would not impact the visibility index in a Class I area.

**Airspace Management.** The existing airspace structure is sufficient and no change to the EAFB or Anchorage Terminal Area airspace structure or management would be required.

**Noise.** Proposed Action noise levels would be compatible with the USAF noise level criterion over residential and other noise-sensitive land uses. The over water noise levels would increase only slightly and would not result in adverse effects on beluga whales.

**Safety.** The Proposed Action would not change the existing ground and weapons/explosives safety environment at EAFB. In addition, it is not expected that the beddown of the C-17 aircraft would adversely impact the flight safety environment or the BASH hazard at EAFB.

**Transportation and Circulation.** The current transportation system would be adequate.

**Hazardous Materials and Waste.** One contaminated site, the fire training area (FT23), and the nearby underground storage tank are within the Proposed Action area of affect. Contaminated soil is being remediated with in situ bioventing systems. Shallow pockets of contamination might exist at the site when construction occurs and would be managed in accordance with applicable regulations. The Proposed Action would be compatible with the land use controls associated with this site. If the soils have not reached clean up levels by the time construction of the Proposed Action begins, a Post-ROD amendment could be issued that would allow contaminated soil to be removed at the time of construction. Groundwater monitoring wells installed in the area proposed for construction of the new C-17 support facilities might be abandoned in order to accommodate the construction program. All wells abandoned would follow Alaska Department of Environmental Conservation guidance. Wells providing critical monitoring data would be replaced as required. It is not expected that operation and maintenance of C-17 aircraft at EAFB would introduce new hazardous materials or generate increased quantities of hazardous waste above current levels.

**Socioeconomics.** There would be approximately 135 additional personnel required at EAFB with the Proposed Action. No adverse impacts would be expected within the region of influence from this

increase in personnel and their associated families. Beneficial impacts to the economy would be expected as a result of the construction of the Proposed Action. No disproportionate effects would be expected on children or on disadvantaged or minority groups as a result of the Proposed Action.

**Cultural Resources.** The Proposed Action would be confined to an area of existing taxiways, hangars, and other support facilities. No impacts to historic, archeological, or other cultural resources would be expected as a result of the Proposed Action. The three historic resources that are in the vicinity of the Proposed Action (Buildings 15515, 15532, and 14545) are documented and managed in accordance with EAFB's *Integrated Cultural Resources Management Plan*.

**Visual Resources/Aesthetics.** The Proposed Action would not cause a negative impact to the visual character of the airfield or surrounding uses.

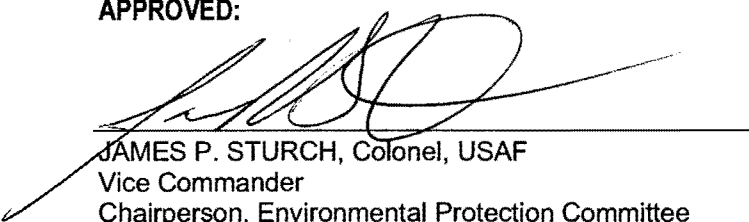
**MITIGATION:** The results of the analysis of the Proposed Action are that there would be no significant direct or indirect effects on the physical, biological, or social components of the affected environment and cumulative impacts would not be significant. Where environmental impacts are probable, mitigation measures are in place.

**CUMULATIVE IMPACTS:** The Proposed Action would not result in a significant cumulative impact as part of the identified ongoing and concurrent activities associated with geological resources, land use, coastal zone management, biological resources, water resources, air quality, airspace management, noise, safety, transportation and circulation, hazardous materials and waste, socioeconomics, cultural resources, or visual resources/aesthetics related to EAFB.

**FINDING OF NO SIGNIFICANT IMPACT:** Based on the EA conducted in accordance with the National Environmental Policy Act, the Council on Environmental Quality regulations, and implementing regulations set forth in 32 Code of Federal Regulations 989 (Environmental Impact Analysis Process), as amended, it is concluded that the environmental effects of the Proposed Action of basing eight C-17 aircraft at EAFB, Alaska, are not significant and that preparation of an Environmental Impact Statement is not warranted. For these reasons, a finding of no significant impact is made. An EA, dated September 2004, is hereby incorporated by reference, and is on file at:

3<sup>rd</sup> Wing Public Affairs  
Environmental Community Affairs Coordinator  
10480 22<sup>nd</sup> Street, Suite 118  
Elmendorf AFB, AK 99506  
ATTN: Mr. Jon Scudder

**APPROVED:**

  
\_\_\_\_\_  
JAMES P. STURCH, Colonel, USAF  
Vice Commander  
Chairperson, Environmental Protection Committee  
Elmendorf Air Force Base, Alaska

  
\_\_\_\_\_  
Date

# COVER SHEET

## Environmental Assessment for C-17 Beddown at Elmendorf Air Force Base, Alaska

**Responsible Agency:** U.S. Air Force (USAF)

**Proposed Action:** Replacement of the 18 existing C-130 aircraft with 8 new C-17 aircraft at Elmendorf Air Force Base (EAFB), Alaska

Written comments and inquiries regarding this document should be directed to:

3rd Wing Public Affairs  
Environmental Community Affairs Coordinator  
10480 22nd Street, Suite 118  
Elmendorf AFB, AK 99506  
ATTN: Mr. Jon Scudder

**Designation:** Final Environmental Assessment

**Abstract:** The purpose of the Proposed Action is to bring the USAF Alaska airlift capabilities to state-of-the-art standards and increase capacity through the addition of new C-17 aircraft. The Proposed Action involves replacing the 18 existing C-130 cargo aircraft fleet with 8 new C-17 aircraft, routine aircraft operations (both mission- and training-related), and the construction and use of support facilities on EAFB. The C-130 aircraft are scheduled to depart EAFB in 2006 and the C-17 aircraft are scheduled to arrive in 2007. New facilities would be constructed in a phased approach in an effort to minimize impacts to normal base operations.

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*Final*

# **Environmental Assessment C-17 Beddown**

**Elmendorf Air Force Base, Alaska**

Prepared for  
**United States Air Force  
3rd Civil Engineer Squadron  
Elmendorf Air Force Base, Alaska**

September 2004

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# Acronyms and Abbreviations

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~	about
°F	degrees Fahrenheit
μN/m <sup>2</sup>	micro Newtons per square meter
μPa	micro Pascals
3 CES/CEVP	3rd Civil Engineer Squadron, Environmental Flight, Planning Section
AAC	Alaska Administrative Code
AADT	annual average daily traffic
AB	Air Base
ACMP	Alaska Coastal Management Program
AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ADEC	Alaska Department of Environmental Conservation
AFCEE	Air Force Center for Environmental Excellence
AFI	Air Force Instruction
AFMAN	Air Force Manual
AFSS	Automated Flight Service Station
AGE	Aerospace Ground support Equipment
AGL	above ground level
AICUZ	Air Installation Compatible Use Zone
ALCOM	Alaskan Command
ALS	Airlift Squadron
AMATS	Municipality of Anchorage Area Transportation Study
AMC	Air Mobility Command
ANGB	Air National Guard Base
APU	Auxiliary Power Units
APZ I	Accident Potential Zone I
APZ II	Accident Potential Zone II
ARFF	Aircraft Rescue and Fire Fighting
AS	Alaska Statute
ATA	Air Traffic Airspace Management Division
ATC	Air Traffic Control
ATCT	Air Traffic Control Tower
AWACS	Airborne Warning and Control System
BASH	Bird-Aircraft Strike Hazard or Wildlife Strike
bgs	below ground surface
BMP	best management practice
BOD	biological oxygen demand
CAA	Clean Air Act

CEMML	Center for Environmental Management of Military Lands
CEQ	Council on Environmental Quality
CES/CEV	Civil Engineer Squadron/Environmental Flight
CFR	Code of Federal Regulations
cfs	cubic feet per second
CO	carbon monoxide
COD	chemical oxygen demand
COE	U.S. Army Corps of Engineers
CONUS	contiguous United States
CRM	Cultural Resources Manager
CRREL	Cold Regions Research and Engineering Laboratory
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
DCED	Department of Community and Economic Development
DNL	Day-Night Average Noise Level
DoD	U.S. Department of Defense
DZ	drop zone
EA	environmental assessment
EAFB	Elmendorf Air Force Base
EDMS	Emissions and Dispersion Modeling System
EIA	Environmental Impact Analysis
EIAP	Environmental Impact Analysis Process
EIS	environmental impact statement
EMS	emergency medical services
E.O.	Executive Order
EPA	U.S. Environmental Protection Agency
ERDC	Engineer Research and Development Center
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulations
FICON	Federal Interagency Committee on Noise
FICUN	Federal Interagency Committee on Urban Noise
FONSI	finding of no significant impact
FR	Federal Register
ft <sup>2</sup>	square foot (feet)
GSE	Ground Support Equipment
HABS/HAER	Historic American Buildings Survey/Historic American Engineering Record
HAP	High Accident Potential
HATR	Hazardous Air Traffic Report
HUD	U.S. Department of Housing and Urban Development

ICRMP	<i>Integrated Cultural Resources Management Plan</i>
IFR	instrument flight rules
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
kHz	kiloHertz
kW	kilowatts
L <sub>dn</sub>	DNL (Day-Night Average Noise Level)
L <sub>max</sub>	Maximum Noise Level
LRRS	long-range radar site
MSL	mean sea level
NAAQS	National Ambient Air Quality Standards
NAF	Non-Appropriated Fund
NAS	National Airspace System
NAVAID	navigational aid
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NM	nautical mile(s)
NO <sub>2</sub>	nitrogen dioxide
NOTAM	Notices-To-Airmen
NO <sub>x</sub>	nitrogen oxides
NRHP	National Register of Historic Places
ORL	Owner Requested Limit
OU 4	Operable Unit 4
PAA	primary aircraft authorization
PACAF	Pacific Air Forces
PCI	Pavement Condition Index
pers. comm.	personal communication
P.L.	Public Law
PM <sub>2.5</sub>	Particulate Matter equal to or less than 2.5 microns in diameter
PM <sub>10</sub>	Particulate Matter equal to or less than 10 microns in diameter
POL	petroleum, oil, or lubricant
ppm	parts per million
PSD	Prevention of Significant Deterioration
ROD	Record of Decision
ROI	region of influence
SAAF	small austere airfield
SEL	Sound Exposure Level
SHPO	State Historic Preservation Officer



SIP	State Implementation Plan
SO <sub>2</sub>	sulfur dioxide
SOV	single occupancy vehicle
SO <sub>x</sub>	sulfur oxides
SPL	sound pressure level
spp.	species (plural)
SWPPP	Storm Water Pollution Prevention Plan
TRACON	Terminal Radar Approach Control
USAF	U.S. Air Force
USARAK	U.S. Army Alaska
U.S.C.	United States Code
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
VA	Veterans Administration
VFR	visual flight rules
VOC	volatile organic compound
WRCC	Western Regional Climate Center

# Executive Summary

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The U.S. Air Force (USAF) is proposing a mission conversion for the existing C-130 aircraft fleet at Elmendorf Air Force Base (EAFB), Alaska. The Proposed Action is for EAFB to beddown and operate eight new C-17 Globemaster III aircraft. The C-17 aircraft are tentatively scheduled to arrive in 2007. As many as 18 C-130 aircraft are scheduled to depart EAFB in 2006.

With proximity and access to the Pacific Rim area, Europe, and North America, EAFB's strategic location is of significant importance to global military operations. The installation's location is ideal for deploying aircraft, troops, and equipment around the world. The C-17 Globemaster III is a state-of-the-art, cargo-carrying aircraft and the USAF's choice for such deployment missions. Additionally, EAFB is both expanding its mission and shifting its emphasis to encompass greater contingency support functions. EAFB has evolved into the main northern hub for contiguous United States (CONUS)-based resources moving westward in the Pacific Rim area. During contingencies, over half of all CONUS-based resources will transit EAFB.

USAF Alaska airlift capabilities would be brought to state-of-the-art standards and increased capacity through the addition of new C-17 aircraft. In addition, it is anticipated that the C-17 aircraft would play a major role in Fort Richardson's 172nd Stryker Brigade combat team, for which U.S. Army Alaska (USARAK) has completed an independent Environmental Impact Statement (Center for Environmental Management of Military Lands, 2004).

To comply with the National Environmental Policy Act (NEPA), as well as with other pertinent environmental requirements, the decision-making process for the Proposed Action includes the development of this environmental assessment (EA) for the proposed C-17 aircraft beddown, operation, and construction projects. This EA, based on the Environmental Impact Analysis Process (EIAP), provides a thorough examination of all significant environmental issues pertinent to the Proposed Action and to the No Action Alternative (which, under NEPA, is always viable and must be evaluated). In doing so, this EA takes into consideration all the recent and thorough environmental analyses conducted in the region of interest and incorporates them by reference where relevant.

The results of the analysis of the Proposed Action are that there would be no significant direct or indirect effects on the physical, biological, or social components of the affected environment and cumulative impacts would not be significant. Where environmental impacts are probable, mitigation measures are in place. Examples of mitigation measures include the following:

- Air traffic and airspace impacts associated with the regular arrival and departure of C-17 aircraft at EAFB have been mitigated in the *Anchorage Terminal Area: Airspace and Procedures Revision Project* (Federal Aviation Administration [FAA], 2002a). However, it should be noted that, since the overall number of cargo aircraft permanently assigned at

EAFB would decrease under the Proposed Action, it is likely that the total number of annual aircraft operations would decrease.

- Since conducting activities and missions in a safe manner is the number one priority in the USAF, all practical methods and procedures are implemented to reduce and mitigate safety hazards that cannot be eliminated. For example, day-to-day operations and maintenance activities conducted by the 3rd Wing are performed in accordance with applicable USAF safety regulations, USAF Technical Orders, and standards prescribed by USAF Occupational Health and Safety requirements. In addition, ordnance and munitions are stored, handled, and maintained in accordance with Air Force Instruction (AFI) 91-201 (*Explosives Safety Standards*; USAF, 1998), appropriate technical orders, and other relevant instructions.
- Any potential impacts from construction activities would be mitigated by ensuring that site-specific best management practices were employed to prevent erosion and prevent any construction debris or pollutants from entering storm water.
- In the event that cultural resources were discovered during any activity on EAFB, the procedures in the *Integrated Cultural Resources Management Plan* (EAFB, 2003c) for unanticipated archaeological discoveries would be followed to maintain compliance with applicable regulations and established procedures for the protection and conservation of cultural resources.

A related but separate effort underway is the *C-17 Flight Training Areas EA* (CH2M HILL, 2004 in process). That EA addresses the predicted impacts of the C-17 flight training missions in Alaskan airspace. The C-17 training missions would probably use existing approved military training routes, military operation areas, restricted areas, slow-speed routes for low altitude training, and air refueling routes while functioning within existing operational parameters. Therefore, no change to existing airspace routes because of C-17 operations would be proposed and no significant impacts would be expected from the flight training missions.

## SECTION 1

# Introduction

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The U.S. Air Force (USAF) is proposing a mission conversion for the existing C-130 aircraft fleet at Elmendorf Air Force Base (EAFB), Alaska. The Proposed Action is for EAFB to beddown and operate eight new C-17 Globemaster III aircraft. The C-17 aircraft are tentatively scheduled to arrive in 2007. As many as 18 C-130 aircraft (16 operational aircraft and two backup inventory aircraft) are scheduled to depart EAFB in 2006.

With proximity and access to the Pacific Rim area, Europe, and North America, EAFB's strategic location is of significant importance to global military operations. The installation's location is ideal for deploying aircraft, troops, and equipment around the world. The C-17 Globemaster III is a state-of-the-art, cargo-carrying aircraft and the USAF's choice for such deployment missions. Additionally, EAFB is both expanding its mission and shifting its emphasis to encompass greater contingency support functions. EAFB has evolved into the main northern hub for contiguous United States (CONUS)-based resources moving westward in the Pacific Rim area. During contingencies, over half of all CONUS-based resources will transit EAFB.

In addition to assets located within the EAFB boundary, the adjacent Fort Richardson Army Post provides EAFB with numerous training, mission-related, and physical resources. Joint training operations allow Alaskan Command (ALCOM) forces to maintain peak readiness while increasing war-fighting skills.

## 1.1 Purpose and Need

The U.S. Department of Defense (DoD) recently released an evaluation of its overall transportation capabilities and needs in *Mobility Requirements Study 2005* (DoD, 2004). This study reported that the DoD will need a minimum of 54.5 million ton-miles in strategic airlift capability per day from active and reserve components of the Air Mobility Command and commercial airliners in the Civil Reserve Airlift Fleet. Current capabilities are estimated to be 46 million ton-miles. Congress approved procurement of 60 additional C-17 aircraft for a total of 180 authorized aircraft for USAF use, as supported in the *Air Mobility Command Strategic Plan* (USAF Air Mobility Command [AMC], 2002).

Part of the proposed USAF mobility plan briefed to Congress in 2002 includes assigning C-17 squadrons within the Pacific Air Forces (PACAF) so that humanitarian missions and responses to regional conflicts can be handled within and around the Pacific Rim area.

The threat of another world war has diminished, but the potential for conflict within and between nations anywhere in the world remains. An airlift fleet with new capabilities, able to move forces over intercontinental distances and deliver them directly to where they are required, is needed to provide rapid deployment of personnel and equipment. This need is illustrated by the following:

- Regional conflicts have become the focus of our national security concerns, along with contingency operations and humanitarian relief efforts.

- Fewer troops are based overseas. Instead, overseas actions depend on resources being sent directly from the United States to areas where there are few or no friendly bases.
- The DoD's Bottom-Up Review (DoD, 1993) concluded that new aircraft are needed to meet probable future mobility requirements.
- In the mobility triad of airlift, sealift, and prepositioning, the C-17 aircraft provides capabilities needed for rapid force deployment, as well as for timely and effective humanitarian relief efforts.

The events following September 11, 2001, clearly demonstrate the need for this capability on a worldwide scale. C-17 aircraft played a major role in deploying troops from the United States to Afghanistan and Iraq. In addition, C-17 aircraft conducted numerous humanitarian relief airdrops to refugees in forward operating areas. During these campaigns, the demonstrated versatility of the C-17 Globemaster III makes it a valuable asset for the United States' armed forces.

The beddown of the C-17 aircraft at EAFB would satisfy the following specific needs:

- Provide a means of maintaining and operating state-of-the-art strategic transport aircraft without sacrificing the USAF's readiness capabilities
- Provide the USAF with an efficient deployment and cargo transport capability in proximity and with access to the Pacific Rim area, Europe, and North America

Airlift capability in the Pacific Rim area will be further enhanced by stationing additional C-17 aircraft at Hickam Air Force Base (AFB), Hawaii.

## 1.2 Mission and Aircraft Characteristics

### 1.2.1 Mission

EAFB is headquarters to ALCOM, which consists of USAF, U.S. Army Alaska (USARAK), and U.S. Navy forces in Alaska. ALCOM's mission includes maintaining United States air sovereignty, deploying forces for worldwide contingencies, providing support to federal authorities during civil emergencies, and conducting joint training for rapid deployment of combat forces. The 11th Air Force, located on EAFB, is the force provider for ALCOM and is tasked to plan, conduct, control, and coordinate air operations as assigned. Additionally, the 11th Air Force supports the North American Aerospace Defense Command, Alaskan Region. EAFB's host unit is the 3rd Wing. As the largest and principal unit within the 11th Air Force, the 3rd Wing trains and equips an Air Expeditionary Force lead wing, which is comprised of 6,900 personnel and F-15C, F-15E, E-3, C-130, and C-12 aircraft. EAFB is also an important refueling stop for C-5 aircraft while deploying cargo abroad.

The 3rd Wing provides airlift in support of two major missions:

- Airborne training for USARAK's 6th Infantry Division (Light).
- Airlift support for 11th Air Force, including logistical support, fighter deployment support, resupply of remote long-range radar sites (LRRSs), and special assignment

airlift missions for Alaskan and Canadian Distant Early Warning stations. C-130 and C-12 aircraft traditionally support these functions.

USAF Alaska airlift capabilities would be brought to state-of-the-art standards and increased capacity through the addition of new C-17 aircraft. In addition, it is anticipated that the C-17 aircraft would play a major role in Fort Richardson's 172nd Stryker Brigade combat team, for which USARAK is currently conducting an independent Environmental Impact Statement (EIS; Center for Environmental Management of Military Lands [CEMML], 2004).

## 1.2.2 Characteristics of the Aircraft

The C-17 Globemaster III is a heavy-lift, air-refuelable cargo and troop transport aircraft. Its airlift capabilities are superior to those of the C-130 aircraft. Designed to support inter- and intra-theater operations, the C-17 aircraft provides direct delivery airlift of all classes of military cargo, including outsized items such as armored vehicles.

The C-17 is a high-wing, T-tailed aircraft with a rear-loading ramp. Four Pratt and Whitney F117-PW-100 turbofan engines power the aircraft. Each engine develops 40,000 pounds of thrust. This enables the aircraft to operate from small austere airfields (SAAFs) and to fly at greater than 450 nautical miles (NM) per hour (knots).

Design features of the aircraft provide reduced takeoff and landing distances, improved lift, and reduced stall risk. Thrust reversers on the engines afford enhanced air and ground maneuverability. The aircraft is capable of backing up a 2 percent grade with 160,000 pounds of cargo. On the ground, the C-17 can make a 180-degree U-turn in 114 feet and a 180-degree "Star Turn" (with backing) in 80 feet. With a payload of 160,000 pounds and an initial cruise altitude of 28,000 feet, the C-17 has an unrefueled range of approximately 2,400 NM. The aircraft's maximum payload is 170,900 pounds. The C-17's cargo compartment accommodates the U.S. Army's wheeled vehicles in two side-by-side rows. Three Bradley infantry fighting vehicles comprise one deployment load. Similarly, the C-17 can carry one M-1 tank, the U.S. Army's newest main battle tank. Figure 1-1 (page 1-5) shows the general characteristics of the C-17 Globemaster III.

## 1.3 Regulatory Compliance

### 1.3.1 National Environmental Policy Act

The National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] 4321 et seq.) requires federal agencies to take into consideration the potential environmental consequences of proposed actions in their decision-making process. The intent of NEPA is to protect, restore, or enhance the environment through well-informed federal decisions. The Council on Environmental Quality (CEQ) was established under NEPA to implement and oversee federal policy in this process. The CEQ subsequently issued "Regulations for Implementing NEPA" (40 Code of Federal Regulations [CFR] 1500-1508). The regulations specify that an environmental assessment (EA) be prepared to:

- Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement (EIS) or a finding of no significant impact (FONSI)

- Aid in an agency's compliance with NEPA when no EIS is necessary
- Facilitate the preparation of an EIS when one is necessary

The proposed C-17 aircraft beddown, operation, and construction projects addressed in this EA constitute a federal action. Therefore, potential impacts must be assessed in accordance with NEPA. DoD Instruction 4715.9 on "Environmental Planning and Analysis" (DoD, 1996a) supplements the requirements of NEPA and the CEQ. That instruction notes that it is DoD policy to prepare the documentation required under NEPA and the CEQ when a proposal for action has the potential for significant environmental impacts and a decision will be made related to one or more alternative means of accomplishing that proposal. The Department of the Air Force's "Environmental Impact Analysis Process (EIAP)" (32 CFR 989; as noted in revised Air Force Instruction [AFI] 32-7061) establishes policies, procedures, and responsibilities for USAF implementation of NEPA. This instruction has been completely revised. It adopts the current Environmental Impact Analysis Process (EIAP; 32 CFR Part 989) as the controlling document on the Air Force EIAP. It eliminates the duplicate and/or superceded language previously included under AFI 32-7061 dated 24 January 1995. The process requires that decisions made on proposed actions be based on an understanding of the potential environmental effects of the action. The EA should discuss "the need for the proposed action, reasonable alternatives to the proposed action, the affected environment, the environmental impacts of the proposed action and alternatives (including the 'no action' alternative), and a listing of agencies and persons consulted during preparation" ("Environmental Assessment," 32 CFR 989.14). "The Air Force may expressly eliminate alternatives from detailed analysis, based on reasonable selection standards (for example, operational, technical, or environmental standards suitable to a particular project). Proponents may develop written selection standards to firmly establish what is a 'reasonable' alternative for a particular project, but they must not so narrowly define these standards that they unnecessarily limit consideration to the proposal initially favored by proponents" ("Analysis of Alternatives," 32 CFR 989.8).

To comply with NEPA, as well as with other pertinent environmental requirements, the decision-making process for the Proposed Action includes the development of this EA for the proposed C-17 aircraft beddown, operation, and construction projects. This EA is based on the EIAP.

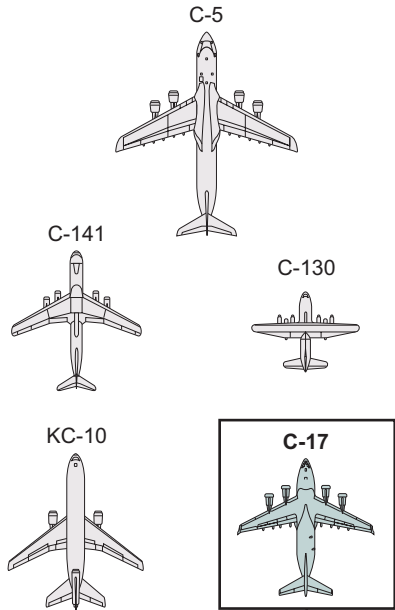
### 1.3.2 Pertinent Environmental and Regulatory Requirements

To ensure compliance with pertinent environmental and legal requirements in addition to NEPA, the decision-making process involves a thorough examination of all significant environmental issues pertinent to the Proposed Action and to the No Action Alternative. In doing so, this EA takes into consideration all the recent and thorough environmental analyses conducted in the region of interest and incorporates them by reference where relevant.

Pertinent environmental and legal requirements include the following:

- State Implementation Plans (SIPs) for attainment of air quality goals. Federal agencies are required to determine the conformity of proposed actions with respect to these SIPs.

### Military Cargo Aircraft in Relative Scale



### C-17 Globemaster III General Characteristics

Wing Area .....	3,800 ft <sup>2</sup>
Wing Sweep .....	25 degrees
Cruise Speed .....	Mach 0.74 - 0.77
Service Ceiling .....	45,000 ft
Unrefueled Range .....	2,400 Nautical Miles
Inflight Refueling Range .....	Unlimited
Maximum Takeoff Gross Weight .....	585,000 lbs
Maximum Fuel Capacity .....	182,720 lbs
Engines .....	F117-PW-100 (Pratt & Whitney PW2040)
Thrust (per engine) .....	40,440 lbs
Fan Tip Diameter .....	85 in.
Weight (per engine) .....	7,100 lbs
Crew .....	Two pilots, one loadmaster
Load	
Paratroopers .....	102
Littered/Ambulatory Patients .....	36/54
Pallet Positions .....	18
Total Maximum Payload .....	170,900 lbs

### C-17 Globemaster III Dimensions

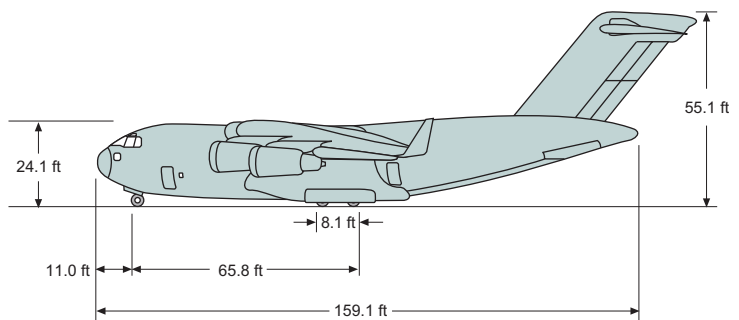
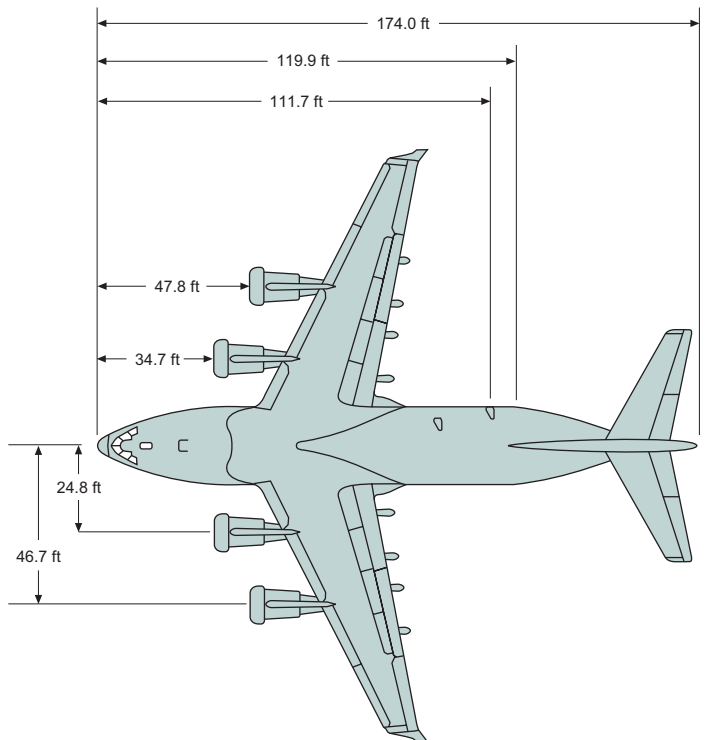
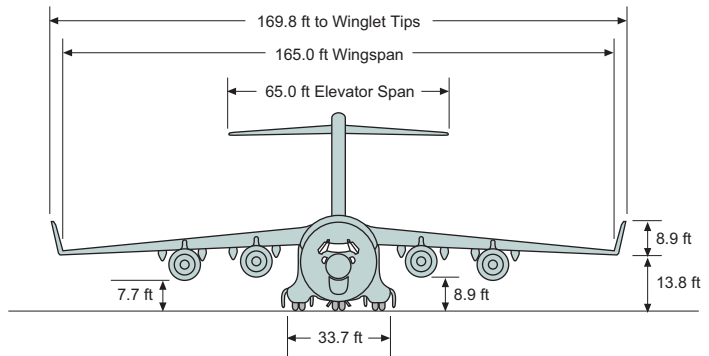


Figure 1-1

### C-17 Globemaster General Characteristics

C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska



- Clean Air Act (CAA) as amended in 1990 (42 U.S.C. 7401 et seq.). Under the CAA, the U.S. Environmental Protection Agency (EPA) has promulgated regulations (40 CFR 51, Subpart W) that require the proponent of a proposed action to perform an analysis to determine if the proposed action conforms to the SIP. To comply with this requirement and to determine conformity, the decision-making process includes a study of air emissions associated with the proposed action.
- Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 et seq.). The ESA is the primary federal legislation regarding biological resources. The act protects proposed and listed threatened and endangered species, as well as the habitats that support such species.
- Clean Water Act (CWA) of 1977 (33 U.S.C. 1251 et seq.). The CWA regulates pollutant discharges that could affect aquatic life forms or human health and safety. The CWA and Executive Order (E.O.) 11990 (regarding the Protection of Wetlands; White House, 1977a) regulate development activities near streams or wetlands.
- National Historic Preservation Act (NHPA) of 1966 (16 U.S.C. 470 et seq.). The NHPA established the National Register of Historic Places (NRHP) and the Advisory Council on Historic Preservation. Under the Section 106 revisions, a formal review process is now in place (36 CFR 800). The NHPA requires federal agencies to consider potential impacts to significant cultural resources that are listed, nominated to, or eligible for listing on the NRHP, designated a National Historic Landmark, or valued by modern Native Americans for maintaining their traditional culture.
- “American Indian and Alaska Native Policy” (DoD, 1998). This established the DoD’s policy for interacting and working with federally recognized American Indian and Alaska Native governments. These principles are based on tribal input, federal policy, treaties, and federal statutes. The DoD policy supports tribal self-governance and government-to-government relations between the federal government and tribes. The DoD’s responsibilities to tribes are derived from:
  - Federal trust doctrine (i.e., the trust obligation of the United States government to the tribes)
  - Treaties, executive orders, agreements, statutes, and other legal obligations between the United States government and tribes, to include:
    - Federal statutes (e.g., Native American Graves Protection and Repatriation Act, American Indian Religious Freedom Act, National Environmental Policy Act, National Historic Preservation Act, Alaska National Interest Lands Conservation Act, Alaskan Native Claims Settlement Act, and Archeological Resources Protection Act); and
    - Other federal policies (e.g., E.O. 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” [White House, 1994a]; E.O. 13007, “Indian Sacred Sites” [White House, 1996]; E.O. 13270 “Tribal Colleges and Universities” [White House, 2002]; Presidential Memorandum: “Government to Government Relations with Native American Tribal Governments,” [White House, 1994b]; and E.O. 13175, “Consultation and Coordination with Indian Tribal Governments” [White House, 2000]).

- “Protection of Wetlands” (E.O. 11990; White House, 1977a). Agencies “shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.”
- “Federal Consistency with Approved Coastal Management Programs” (15 CFR 930). The Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.) was enacted to protect the nation's coastal zone and is implemented through state-federal partnerships to assure that such things as development projects directly affecting the coastal zone are undertaken in a manner consistent to the maximum extent practicable with approved state coastal management programs.
- Essential Fish Habitat Provisions (50 CFR 600) of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.). These provisions promote “the protection of essential fish habitat in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat.”
- “Floodplain Management” (E.O. 11988, White House, 1977b). Agencies “shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.”
- “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” (E.O. 12898, White House, 1994a). “Each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Marian Islands.”
- “Protection of Children from Environmental Health Risks and Safety Risks” (E.O. 13045, White House, 1997). “Each federal agency: (a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and (b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.”

### 1.3.3 Interagency and Intergovernmental Coordination for Environmental Planning

The USAF recognizes that major USAF installations are community and industrial employment centers. Ongoing coordination with other federal, state, and local agencies and an informed public assist the entire community to understand and support the USAF's mission. The USAF has developed a program for Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) activities. AFI 32-7060 (USAF, 1994a) is the principal USAF regulation that governs the way the USAF implements IICEP. The USAF's EIAP is subject to IICEP as well as to “Air Installation Compatible Use Zone/Land Use Compatibility” (AFI 32-7063, USAF, 2002), “Integrated Natural Resources

Management” (AFI 32-7064, USAF, 1994b), and “Cultural Resources Management” (AFI 32-7065, USAF, 1994c) regulations.

## 1.4 Organization of This Environmental Assessment

This EA contains the following seven sections and two appendices:

- Section 1 provides the purpose of and need for the Proposed Action, mission and aircraft characteristics, and regulatory compliance.
- Section 2 provides a detailed description of the Proposed Action and the No Action Alternative evaluated in this EA. This section also includes a discussion of an alternative considered but not carried forward.
- Section 3 provides a description of the existing environmental condition of the C-17 beddown location on EAFB as well as the proposed airspace in the area affected by the Proposed Action.
- Section 4 describes the significant criteria used in conducting the analysis for each resource and provides an analysis of the potential impacts to each particular resource as a result of the Proposed Action and the No Action Alternative.
- Section 5 provides the cumulative impacts analysis and a summary of the findings.
- Section 6 provides a list of references, persons, and agencies used in developing this document.
- Section 7 provides a list of those people who prepared the document
- Appendix A contains information about the Air Quality Conformity Consultation.
- Appendix B is the Noise Analysis Technical Memorandum.

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## SECTION 2

# Description of Proposed Action and Alternatives

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The following subsections describe the process followed by the USAF to select the basing location for the Proposed Action, provide a detailed description of the Proposed Action, describe the No Action Alternative to the Proposed Action, and discuss an alternative considered but not carried forward.

## 2.1 USAF's Process for Selecting C-17 Beddown Basing Location

### 2.1.1 C-17 Beddown Basing Assessment

An airlift fleet with new capabilities, able to move forces over intercontinental distances and to deliver directly as required, is needed to provide rapid deployment of personnel and equipment. The C-17 aircraft was designed to combine the attributes of a strategic airlifter with those of a tactical airlifter. Large-bodied aircraft such as the C-17 are considered strategic assets. No large-bodied aircraft have ever been stationed within PACAF. Stationing C-17 aircraft within the northern sector of PACAF would provide PACAF commanders the flexibility required to meet their missions.

### 2.1.2 C-17 Beddown Basing Selection Criteria

The primary criteria considered in selecting a suitable installation to beddown C-17 aircraft within PACAF are as follows:

- Geographic location
- Existing base infrastructure
- Military airspace and training areas required
- Community factors

Table 2-1 lists the screening criteria and requirements used by the USAF to select installations within PACAF that would receive new C-17 aircraft.

As a strategic airlift asset, the C-17 should be located within the political boundaries of the United States and be centrally located within PACAF. The C-17 beddown location should be able to host the aircraft and its support infrastructure without extensive facility construction or land acquisition. Basing the C-17 near a major metropolitan area provides access to a large civilian labor workforce and community for support. The local economy is also strengthened by the presence of the unit.

**TABLE 2-1**

Selection Criteria for C-17 Beddown Basing Location  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Screening Criteria	Requirements
Geographic Location	Within Pacific Air Forces and the borders of the United States Near a metropolitan area
Existing Base Infrastructure	Adequate existing facilities without requiring extensive construction or land acquisition Space available for new construction Relatively low cost of renovations or new construction
Military Airspace and Training Areas Required	Existing military training routes Drop zones in proximity of installation Access to a site for small austere airfield training Other areas available for establishment of additional airspace
Community Factors	Noise Safety External infrastructure demand (increase in water, electricity, and other needs)

The receiving installation must be able to support large-scale cargo movement and handling. An air installation with an existing mobility infrastructure best suits the needs of PACAF and its customers. The infrastructure required includes passenger handling areas; a large cargo handling facility; cargo marshaling, processing, and storage areas; a dedicated indoor cargo storage facility; and a system that provides intermodal transfer of cargo to and from the receiving installation via roadway, rail line, and/or seaport. Additionally, the receiving installation must have adequate aircraft parking and refueling capabilities for large-body aircraft.

The C-17 aircrews require intensive training that must be supported by the receiving installation and its surrounding environment. The adequacy of the airspace surrounding the installation to support C-17 operations is determined by several factors. Use of restricted airspace and military training routes, air refueling corridors, drop zones (DZs), and the accomplishment of practice takeoffs and landings place demands on the airspace infrastructure. Flight training missions for C-17 aircrews include low-altitude navigation training flights and airdrop approaches. DZs are used to train aircrews in actual or simulated cargo or personnel airdrops. Access to air refueling tracks and tanker aircraft is necessary for the air refueling training required for all C-17 aircrews.

An essential capability of the C-17 aircraft is that it can operate into and from airfields with short runways (also known as SAAF). The ideal installation should possess, have access to, or have the capability to develop an adequate SAAF runway. While SAAF landings can be practiced on a large runway, an actual SAAF runway is essential for realistic training to meet current training requirements. No SAAF runway has been selected for use by EAFB's aircrews. This decision will be made after completing a separate environmental document

(CH2M HILL, 2004 in process). That document will evaluate alternative locations for the assault landing zones and DZs needed for completing the C-17 training mission.

The potential impacts on the surrounding community must also be considered in the decision related to the C-17 basing location. A primary concern is development and encroachment in the areas immediately surrounding the installation. Some of the factors that must be considered include:

- Evaluating the noise from aircraft operations, which can be an irritant to nearby residents
- Maintaining the safety of the community, which is of prime importance to the USAF
- Assessing the ability of the local community infrastructure to accommodate changes in personnel assigned to the installation resulting from construction of facilities and the beddown, operation, and maintenance of new C-17 aircraft.

### 2.1.3 Basing Locations Evaluated

Utilizing the beddown basing selection criteria, the following active DoD military bases were evaluated for the potential basing of the C-17:

- Hickam AFB, Hawaii
- Marine Corps Base Hawaii
- Elmendorf AFB, Alaska
- Eielson AFB, Alaska
- Kulis Air National Guard Base (ANGB), Alaska
- Anderson AFB, Guam
- Yokota Air Base (AB), Japan
- Osan AB, Republic of Korea

The findings related to the basing selection criteria are listed in Table 2-2.

### 2.1.4 Basing Locations Considered and Carried Forward

Both Hickam AFB and EAFB met all the evaluation criteria for C-17 beddown. Separated by 4,445 kilometers, (2,762 miles), each installation serves separate sectors of PACAF. Hickam AFB was chosen to support the tactical and strategic mission of the C-17 for the southern reaches of PACAF. Its C-17 beddown program is being addressed through a separate EIAP (USAF, 2003).

This EA is being prepared to evaluate EAFB as a potential host for a squadron of C-17s to support the northern sector of the command.

### 2.1.5 Basing Locations Considered and Not Carried Forward

The sites and options for the northern sector of PACAF that were eliminated from further evaluation are:

**TABLE 2-2**  
 Potential C-17 Beddown Basing Locations within Pacific Air Forces  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>Evaluation Criteria</b>	<b>Hickam AFB</b>	<b>Marine Corps Base Hawaii</b>	<b>Elmendorf AFB</b>	<b>Eielson AFB</b>	<b>Kulis ANGB</b>	<b>Anderson AFB</b>	<b>Yokota AB</b>	<b>Osan AB</b>
<b>Geographic Location</b>								
Within Pacific Air Forces and the borders of the United States	Y	Y	Y	Y	Y	N	N	N
Near a metropolitan area	Y	Y	Y	Y	Y	N	Y	N
<b>Existing Base Infrastructure</b>								
Adequate existing facilities without extensive construction or land acquisition	Y	N	Y	N	N	Y	Y	Y
Space available for new construction	Y	Y	Y	Y	N	Y	Y	Y
Relatively low cost of renovations or new construction	Y	N	Y	N	N	N	N	N
<b>Military Airspace and Training Areas Required</b>								
Existing military training routes	Y	Y	Y	Y	Y	Y	Y	Y
Drop zones in proximity of installation	Y	Y	Y	Y	Y	N	N	N
Access to a site for small austere airfield training	Y	Y	Y	Y	Y	N	N	N
Other areas available for establishment of additional airspace	Y	Y	Y	Y	Y	N	N	N
<b>Community Factors</b>								
Noise	Y	Y	Y	Y	Y	Y	Y	Y
Safety	Y	Y	Y	Y	Y	Y	Y	Y
External infrastructure demand	Y	Y	Y	Y	Y	Y	Y	Y
Notes: AB = Air Base AFB = Air Force Base ANGB = Air National Guard Base N = No Y = Yes								

- Eielson AFB, which is located in interior Alaska. It does not include cargo operations as part of its normal mission. Since EAFB already supports strategic airlift and cargo operations, the C-17 aircraft can be more cost-effectively integrated into the existing infrastructure at EAFB.



- The Alaska Air National Guard installation at Kulis ANGB is located at the Ted Stevens Anchorage International Airport. The required C-17 facilities cannot be constructed at Kulis ANGB because of spatial constraints resulting from the on-going expansion of Ted Stevens Anchorage International Airport.

## 2.2 Proposed Action

The Proposed Action would involve replacement of the existing C-130 cargo aircraft fleet with new C-17 aircraft. Eight C-17s would be stationed at EAFB, and 18 C-130 aircraft would be assigned to military installations outside of Alaska. To continue to supply remote DoD sites in Alaska and Canada, it is expected that four smaller cargo aircraft with characteristics similar to C-130 aircraft would continue to operate from Kulis ANGB or on a contract basis.

Construction of new facilities, modification of existing facilities, and replacement of aircraft maintenance equipment would be required (Figure 2-1, page 2-7). A net increase of 135 positions at EAFB would result from converting from C-130s to C-17s.

The Proposed Action would consist of routine aircraft operations (both mission- and training-related) in the vicinity of EAFB, the construction and use of support facilities on EAFB, and an increase in the number of people needed to support all EAFB mission-related activities.

The Proposed Action has been assigned to an area north of the east-west runway (Figure 2-2, page 2-9). This location was selected based on an analysis of siting alternatives conducted as a separate study. This study, known as the Elmendorf AFB C-17 Beddown Master Plan (USAF CE, 2003a), considered three distinct development concepts for the beddown of C-17 aircraft at EAFB. Criteria used to select a development concept included ensuring consistency with the EAFB 50-year plan (USAF 3 CES/CECD, 2003), evaluating current land uses, minimizing the demolition of existing facilities, and considering safety factors.

The preferred area for C-17 aircraft beddown is in the vicinity of the current C-130 operating area at the north ramp. It was selected based on the following rationale:

- Eighteen C-130 aircraft are scheduled to depart EAFB, leaving a large area available for staging C-17 operations.
- It is anticipated that the north ramp area would be used solely for cargo aircraft operations based on the EAFB 50-year plan (USAF 3 CES/CECD, 2003). Fighter operations would be staged at an area east of Runway 16-34 that is already under development.
- The north ramp area is close to the Joint Mobility Complex and the aircraft ground equipment facility, both of which are integral to C-17 operations.

### 2.2.1 Location of the Proposed Action

EAFB is roughly a triangular-shaped installation located in south-central Alaska along Knik Arm at the headwaters of Cook Inlet (latitude/longitude 61°15'N/149°18'W). (Figure 2-3,

page 2-11). EAFB comprises 13,130 acres and extends approximately 7.4 miles along the Knik Arm. It is bordered on the north and west by Cook Inlet; on the south by residential, industrial, and business districts of Anchorage; and on the east by Fort Richardson.

## 2.2.2 Aircraft Operations

Aircraft operations would consist of mission- and training-related approaches and departures from EAFB. Although a detailed operations plan for C-17 operations in Alaska has not yet been created, the following operations concept has been developed to support the overall mission planning effort:

- Eight C-17 Globemaster III Primary Aircraft Authorizations (PAA) would be stationed at EAFB.
- Each of the eight PAA stationed at EAFB would be budgeted for 1,300 to 1,450 flying hours per year.
- A mission utilization rate of 75 percent of these flying hours is projected.
- Resupply of 611th Air Support Group facilities would be accomplished by either C-130 aircraft from Kulis ANGB or by contracted smaller cargo aircraft. However, C-17 aircraft may conduct resupply missions at facilities with paved runways (Galena Forward Operating Location, King Salmon Forward Operating Location, and Eareckson Air Station [Shemya Island]).

EAFB currently supports roughly 65,000 aircraft operations annually. It is estimated that, based on the number of mission- and training-related hours allocated for C-17 operations, C-17 aircraft would conduct roughly 4,000 annual operations at EAFB. These operations would be related to active missions and training exercises, including regular approaches from EAFB and touch-and-go landings. In addition, it is expected that missions to resupply radar sites would result in approximately 1,500 annual operations at EAFB.

The Anchorage Terminal Radar Approach Control (TRACON) provides radar service to aircraft within a 30-mile radius of Anchorage, including aircraft operating to and from EAFB, Merrill Field, Lake Hood Seaplane Base, and Ted Stevens Anchorage International Airport. Table 2-3 summarizes aircraft operations data within the Anchorage TRACON for the 5-year period from 1996 to 2000 and Federal Aviation Administration (FAA) forecasts to 2005 (FAA, 2002a).

To manage increased airspace usage and to ensure continued aviation safety, the FAA has developed a new airspace plan for the Anchorage Terminal Area. This project, the Anchorage Terminal Area Airspace and Procedures Revision Project, is currently being prepared in anticipation of increased air traffic. For airspace modeling purposes, the FAA used total aircraft operations volumes ranging from 504,043 (1997 activity levels) to 670,125 (forecasted activity). The forecasted volume is almost double the volume recorded for calendar year 2000. Aircraft operations volumes would increase dramatically, impacting operations in the Anchorage Terminal Area.

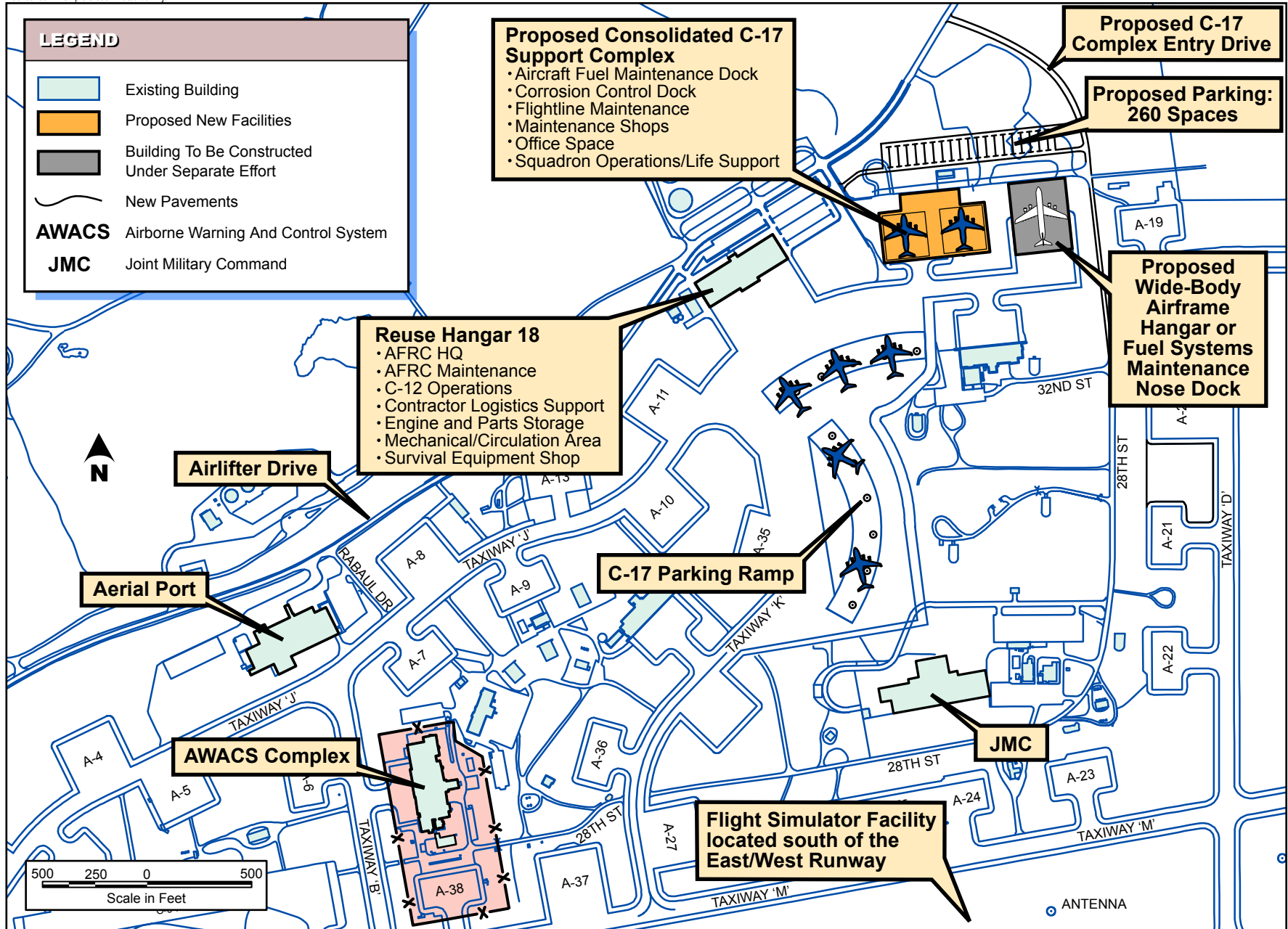


Figure 2-1  
**Proposed Action Development Concept**  
 C-17 Beddown Environmental Assessment  
 Elmendorf Air Force Base, Alaska

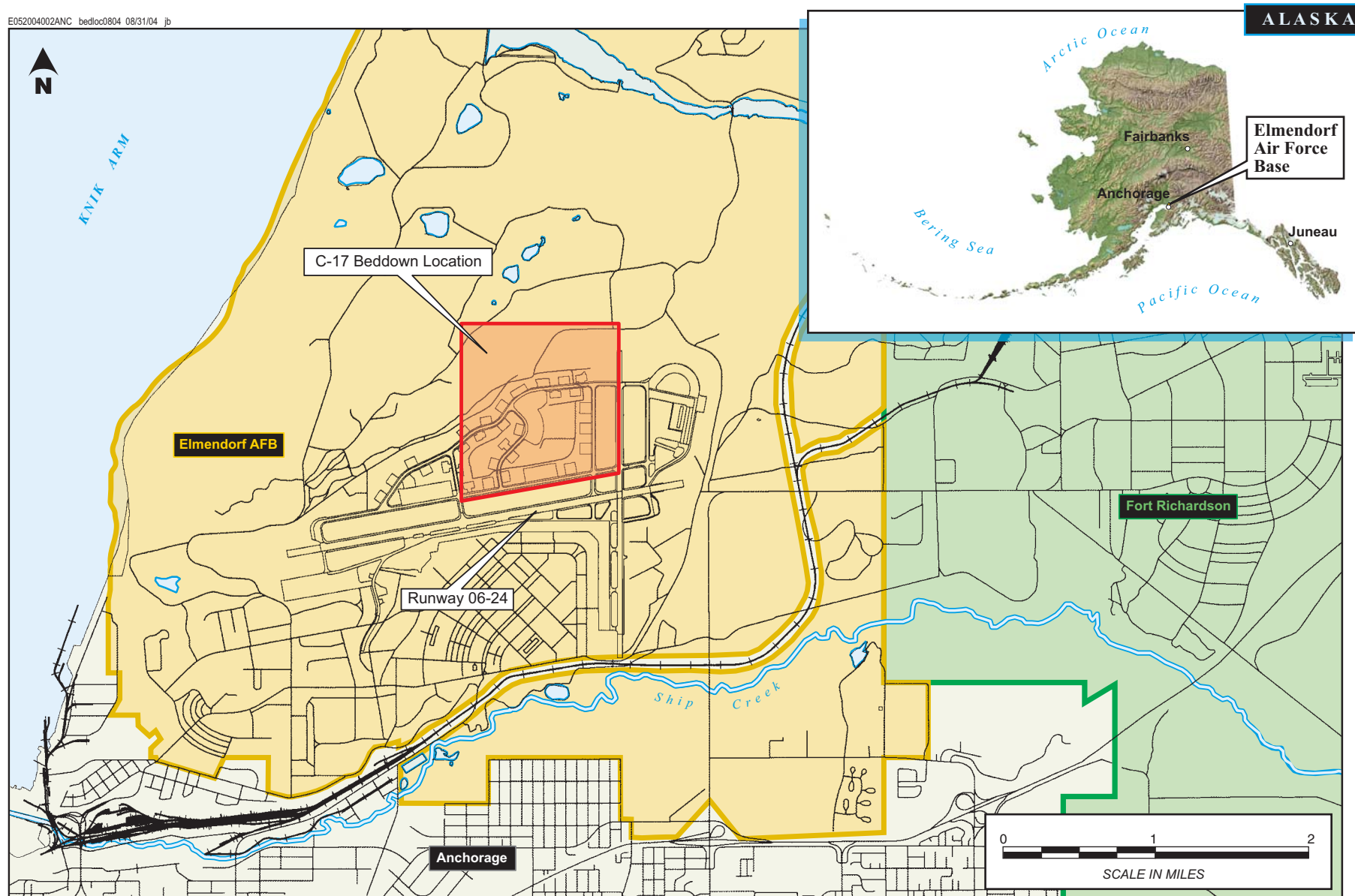
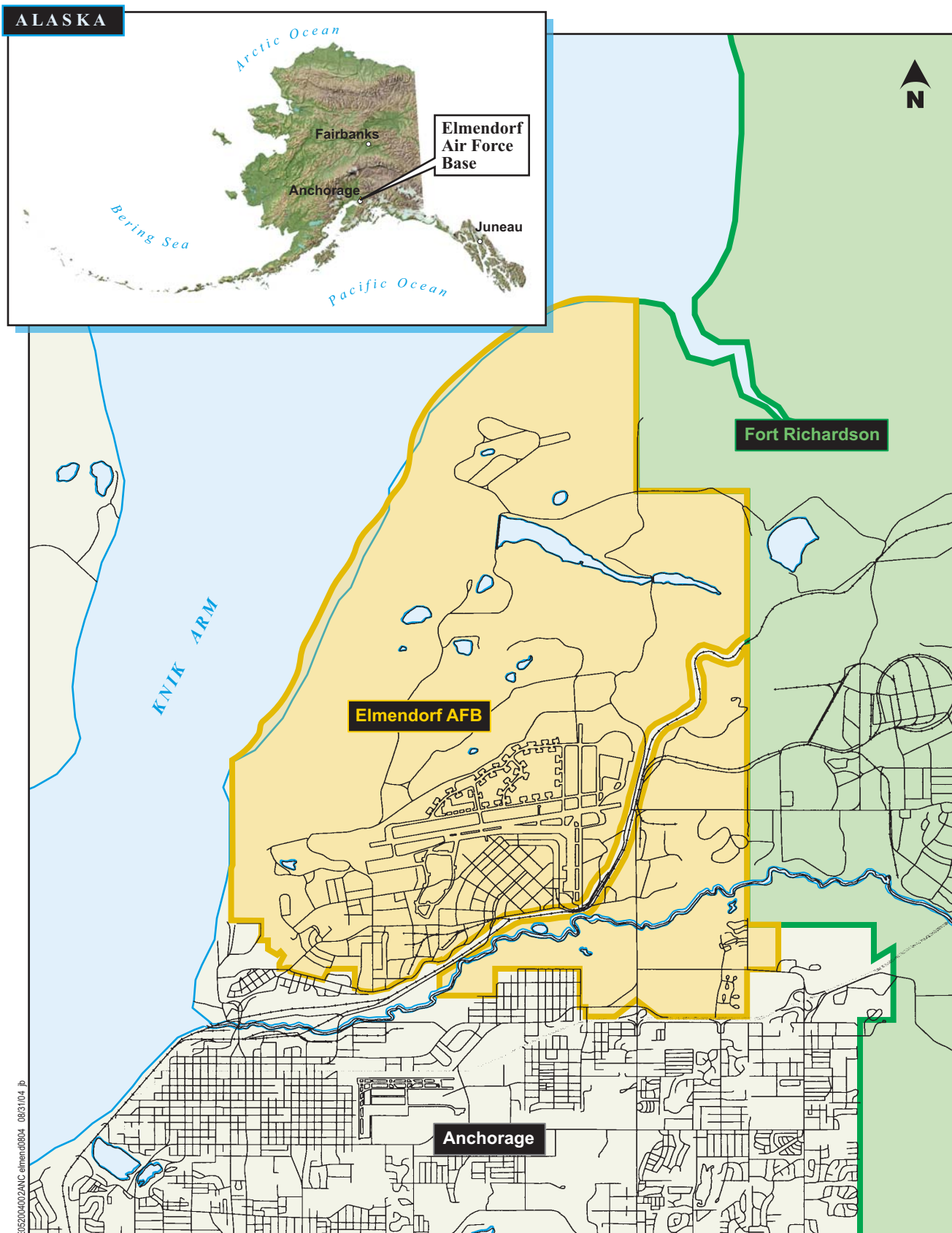


Figure 2-2

### C-17 Beddown Location

C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska



**TABLE 2-3**  
 Summary of Anchorage Terminal Area Aircraft Operations  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Calendar Year	Total Aircraft Operations	Average Annual Compound Growth Rate
1996	297,341	—
1997	324,321	9.0%
1998	325,556	<1.0%
1999	326,197	<1.0%
2000	342,032	4.9%
2005	405,401	3.5%
Airspace modeling basis	504,043 to 670,125	
Source: Federal Aviation Administration, <i>Anchorage Terminal Area: Airspace and Procedures Revision Project</i> , 2002a		

These forecasts account for increases in aviation demand on an aggregate basis and anticipate activity by all types of aircraft, including increased air traffic at EAFB for anticipated new missions. Therefore, air traffic and airspace impacts associated with the regular arrival and departure of C-17 aircraft at EAFB have been mitigated in the *Anchorage Terminal Area: Airspace and Procedures Revision Project* (FAA, 2002a). However, it should be noted that, since the overall number of cargo aircraft permanently assigned at EAFB would decrease under the Proposed Action, it is likely that the total number of annual aircraft operations would decrease.

### 2.2.3 Personnel Summary

Additional personnel would be required to operate, maintain, and support aircraft operations for the C-17 and small cargo aircraft stationed at EAFB. The C-17 mission would create 731 positions, and the reassignment of the C-130s would result in a decrease of 696 positions. In addition, approximately 100 people would be needed to support remote radar site resupply missions. Therefore, there would be a net increase of 135 positions at EAFB as a result of converting from C-130s to C-17s (Table 2-4).

Based on information provided at the 4 August 2003 Site Activation Task Force II Out Brief, most personnel to support the C-17 mission would be retrained staff who currently support the C-130 mission. Of the approximately 135 additional personnel required to fill all identified positions on EAFB under the Proposed Action, an estimated 20 percent (approximately 30 individuals) would reside on EAFB and the remaining personnel (105 individuals) would live within 45 miles of EAFB.

**TABLE 2-4**

Proposed Action: C-17 Beddown Personnel Requirements  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>Function</b>	<b>Approximate Number of Positions</b>
Reduction in support positions with removal of C-130s	-696
Positions required to support radar site resupply	+100
Positions required for support of C-17s	+731
<b>Net Change in Personnel</b>	<b>+135</b>

## 2.2.4 Capital Improvements Program

Although existing facilities and infrastructure at EAFB would be used to the maximum extent possible to support C-17 aircraft, several additional facilities are needed. New facilities would be constructed in a centralized area immediately north of Taxiway J and east of Hangar 18. These facilities would be constructed in a phased approach in an effort to minimize impacts to normal base operations. Table 2-5 (page 2-17) lists the new facilities that would be constructed as well as the existing facilities requiring modifications and alterations as part of the C-17 beddown program. Figure 2-1 (page 2-7) shows the proposed construction program.

The new and modified facilities would support many functions. For example, the C-17 maintenance complex (dual bay hangar) would support general aircraft maintenance and limited aircraft spot painting (corrosion control). Flightline maintenance, avionics, general-purpose shops, and office space would also be housed in this hangar. In addition, the C-17 fuel cell hangar/nose dock would be sized to accommodate the Boeing 767 airframe. Note, however, that the C-17 fuel cell hangar/nose dock would be replaced by a large-airframe hangar if Congress appropriates the budget for it.

Because the facilities would be constructed in a centralized location at EAFB, existing facilities would be demolished in the same area. Facilities that would be demolished under this effort include:

- Hangar 12 (~ 30,000 square feet)
- Building 17506 (~2,500 square feet)
- Building 17511 (~3,000 square feet)
- Building 17514 (~5,000 square feet)

Figure 2-4 (page 2-15) shows the area where building demolition is anticipated.



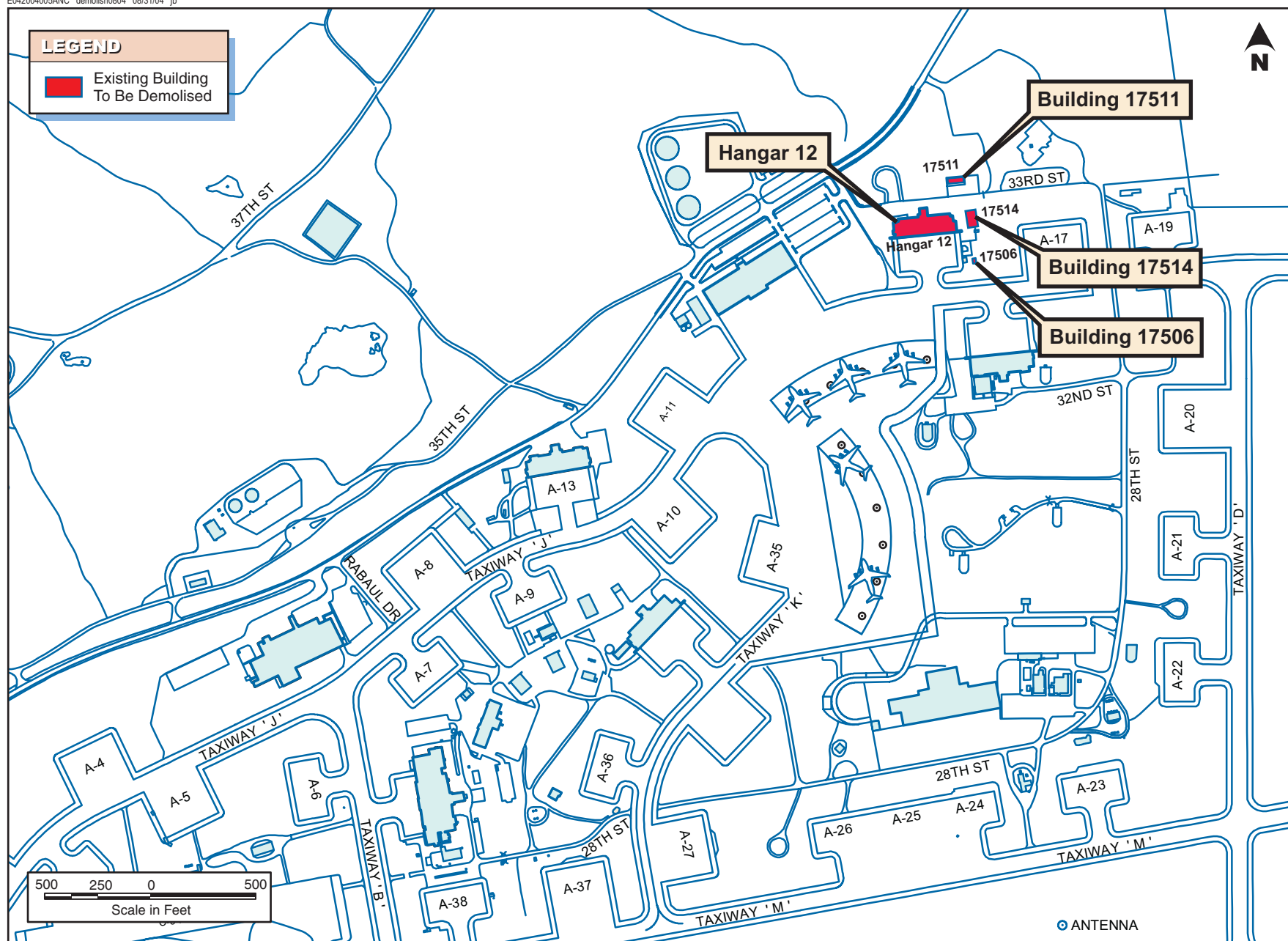


Figure 2-4

### Demolition Area for C-17 Beddown

C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska



**TABLE 2-5**

Proposed Action: Necessary Capital Improvements for C-17 Beddown  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>Capital Improvement Description</b>	<b>Total Area</b>
Construct Consolidated C-17 Support Complex (Dual Bay Hangar)	162,798 ft <sup>2</sup>
<ul style="list-style-type: none"> <li>• Maintenance Hangar Bay</li> <li>• Corrosion Control Hangar Bay</li> <li>• Squadron Operations with Life Support</li> <li>• Composite Corrosion Shops</li> <li>• Structural Metal Shop</li> <li>• Nondestructive Inspection Shop</li> <li>• Inspection Shop</li> <li>• Flightline Maintenance</li> <li>• Office Space</li> </ul>	
Construct C-17 Fuel Cell Hangar/Nose Dock <sup>a</sup>	32,500 ft <sup>2</sup>
Construct C-17 Flight Simulator Facility	12,589 ft <sup>2</sup>
Add/Alter Hangar 18	93,516 ft <sup>2</sup>
<ul style="list-style-type: none"> <li>• Headquarters Air Force Reserve Command (Administration)</li> <li>• Air Force Reserve Command Maintenance</li> <li>• C-12 Operations</li> <li>• Contractor Logistics Support</li> <li>• Engine and Aircraft Parts Storage</li> <li>• Mechanical/Circulation Area</li> </ul>	
Construct Roads, Utilities, and Parking	Varies
Add/Alter Survival Equipment Shop	2,800 ft <sup>2</sup>
<b>Total</b>	<b>&gt; 304,203 ft<sup>2</sup></b>
<p>Notes:</p> <p><sup>a</sup>The nose dock would only be constructed if Congress does not appropriate the budget for a large-airframe aircraft hangar project. The large-airframe hangar is addressed under a separate environmental assessment (EAFB, 2003a).</p> <p>ft<sup>2</sup> = square feet</p>	

## 2.3 No Action Alternative

In addition to the Proposed Action, the following No Action Alternative is being evaluated with this EA.

Under NEPA, the No Action Alternative is always viable and must be evaluated. The No Action Alternative would result in no additional airlift capability being assigned to the

northern sector of PACAF. The C-17 beddown, associated construction, and changes in personnel requirements and airspace usage would not occur. The C-130 aircraft would not be reassigned to other air installations outside of Alaska and conditions would remain as they are today.

## **2.4 Alternative Action Considered but Not Carried Forward**

An alternative action considered but eliminated from further evaluation was the combined airlift option. This alternative consisted of the beddown and operation of 8 new C-17 Globemaster III aircraft, which are tentatively scheduled to arrive at EAFB in 2007, and the departure of 14 C-130 aircraft in 2006. Under this alternative, remote LRRSs in Alaska would have been resupplied by the four C-130 aircraft remaining at EAFB.

This alternative is not carried forward for analysis. The combined airlift option would require the operation of both a C-17 squadron and a C-130 squadron. The maintenance of two squadrons under these circumstances is not operationally feasible.

## SECTION 3

# Affected Environment

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The following sections discuss the environment that might be affected by the Proposed Action and the No Action Alternative.

Facets of the environment include:

- Geological Resources
- Land Use
- Coastal Zone Management
- Biological Resources
- Water Resources
- Air Quality
- Airspace Management
- Noise
- Safety
- Transportation and Circulation
- Hazardous Materials and Waste
- Socioeconomics
- Cultural Resources
- Visual Resources/ Aesthetics

## 3.1 Geological Resources

EAFB is located on the north end of the Anchorage lowland. It is bordered by the Knik Arm of Cook Inlet to the north and west, the Municipality of Anchorage to the south, and Fort Richardson to the east. The site geology is complex.

### 3.1.1 Definition of Resource

Geological resources consist of the earth's surface and subsurface materials. These areas are typically described in terms of topography and geology.

### 3.1.2 Existing Conditions

The northern portion of the site contains part of the Elmendorf Moraine, an end moraine consisting of sequences of coarse gravels, poorly graded fine sands, silts, clays, and glacial till (Hunter et al., 2000).

South of the Elmendorf Moraine, the terrain flattens and the end moraine deposits are inter-fingered with alluvium deposited by glacial meltwater, Eagle River, and mountain valley sources. The alluvium consists of poorly graded sands and gravels that often cut across older glacial deposits (Hunter et al., 2000).

At the west end of the site, the sands and gravels are underlain by silts, clays, and fine sands corresponding to the Bootlegger Cove Formation, glacioestuarine deposits that have been

found to be 115 feet or more thick. The Proposed Action is at the margins of this formation, where the fine-grained deposits are often inter-fingered with coarser materials (Hunter et al., 2000).

Permafrost is not expected at the site and was not found during this investigation or in the documentation of previous investigations that were available. If subsequent investigations identify the presence of permafrost, its impact on site development would need to be evaluated.

Borings developed as part of the 2002 geotechnical data report (CH2M HILL, 2002) and other geotechnical and geological information (Hunter et al., 2000) were reviewed. Based on this review, the C-17 beddown site, also known as North Area 2, is near the boundary of three distinctly different geologic units. The western end of the runway is underlain by fine-grained silts and clays of the Bootlegger Cove Clay Formation. This fines-unit contains zones of low strength and high compressibility, is frost susceptible, and does not drain well. These soils are typically poor foundation materials.

The remainder of the runway area at EAFB is underlain by surficial zones of sand and gravel deposited as either glacial outwash or alluvium along stream channels. The sand and gravel is typically well drained, high in strength, low in compressibility, nonfrost susceptible, and an excellent foundation material.

The area north of the flightline at EAFB includes part of the southern terminus of the Elmendorf Moraine (Figure 3-1, page 3-3). Because North Area 2 is close to the boundary of these three units, a review of existing soil boring logs or site-specific exploration would be necessary to define the soils below each facility.

## 3.2 Land Use

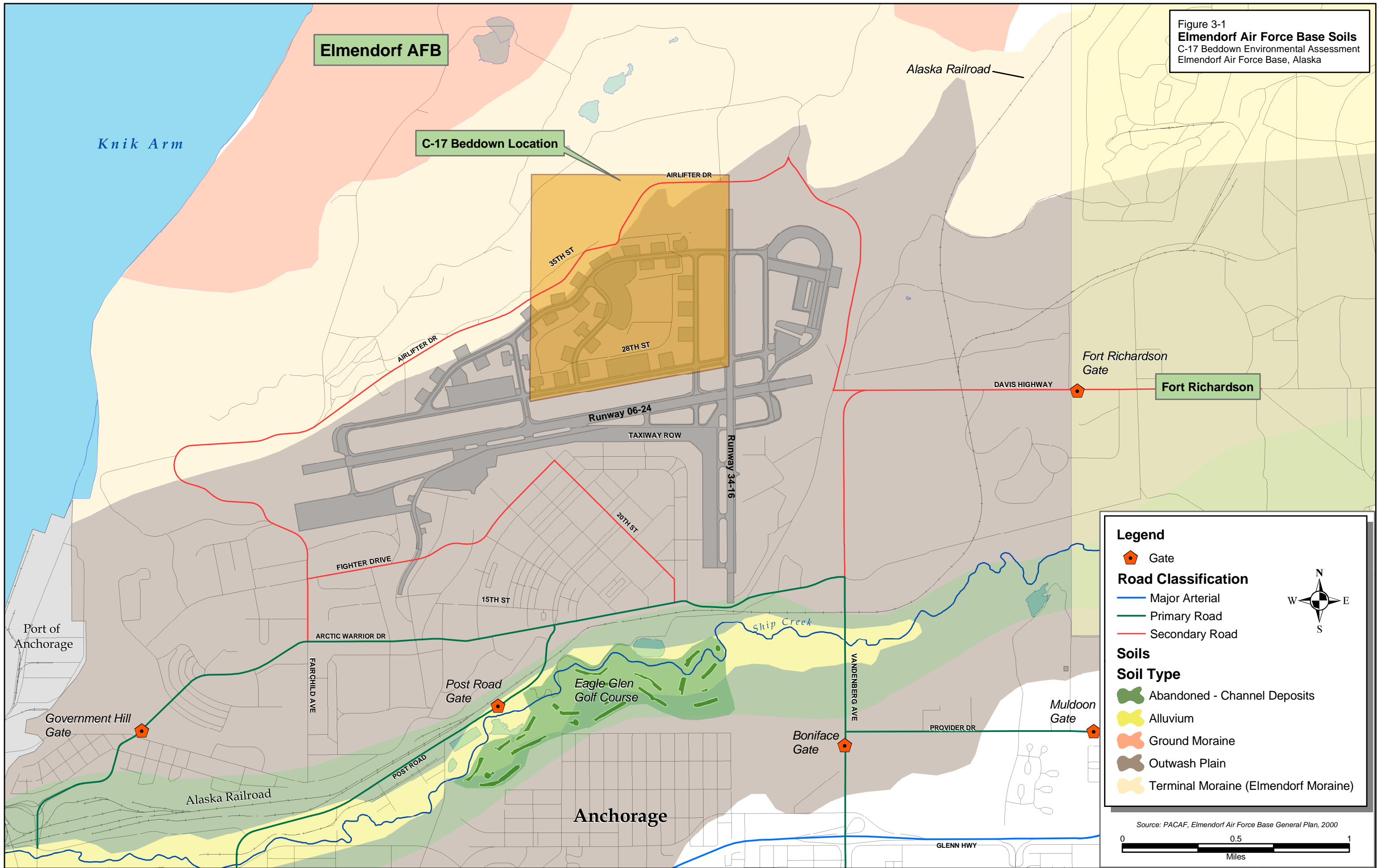
### 3.2.1 Definition of Resource

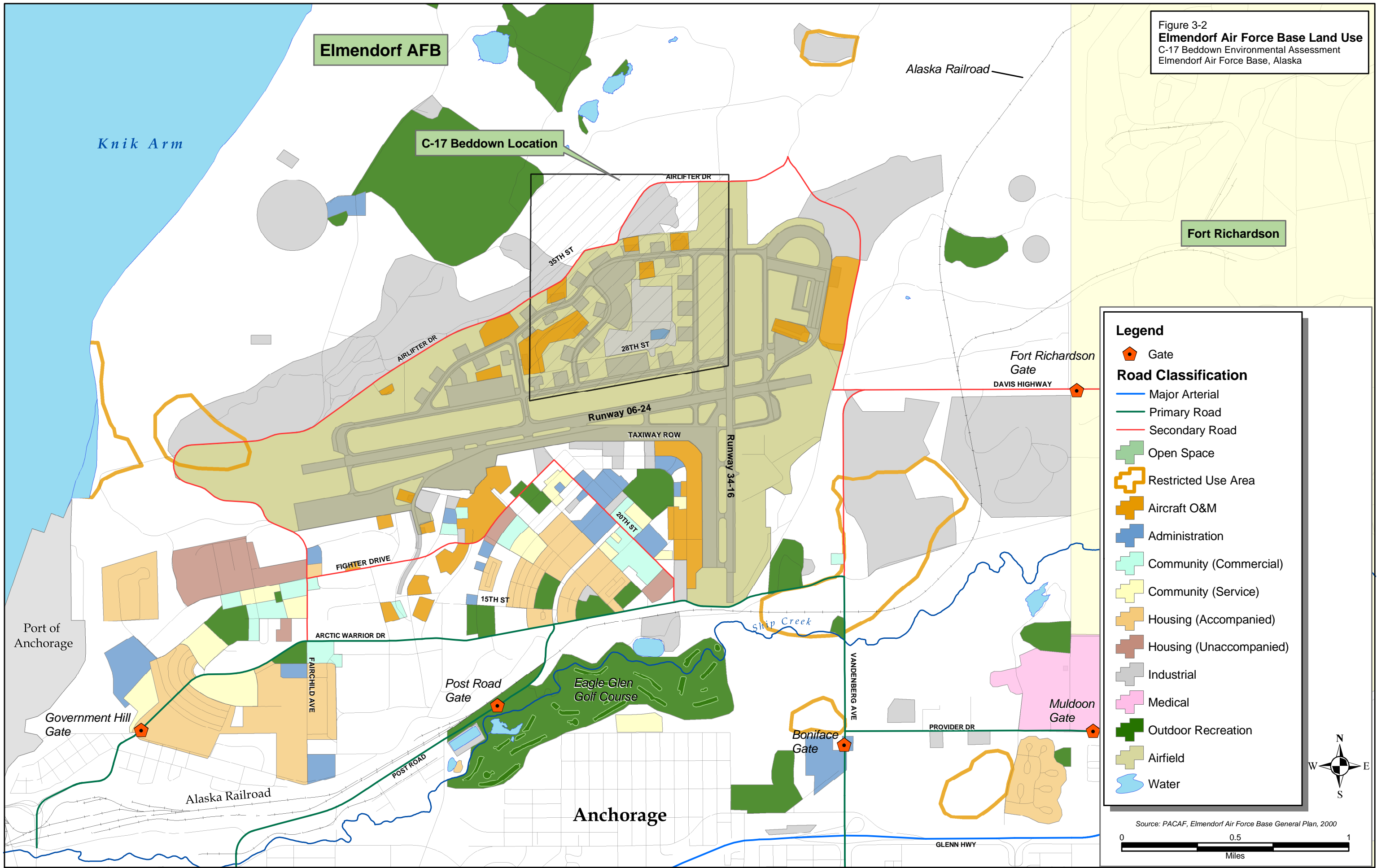
Natural land-use classifications include wildlife areas, forests, and other open or undeveloped areas. Human land uses include residential, commercial, industrial, utilities, recreational, and other developed uses. Management plans, policies, ordinances, and regulations determine the types of uses that are allowable, or protect specially designated or environmentally sensitive areas. The attributes of land use addressed in this EA include general land-use patterns, land ownership, and special use areas. General land-use patterns characterize the types of uses within a particular area.

### 3.2.2 Existing Conditions

Land-use patterns for guiding future EAFB facility development are outlined in the General Plan (PACAF, 2004 in process). In that plan, land in the vicinity of the Proposed Action had been identified to support future airfield and aircraft operations and maintenance activities. Existing land uses within the study area are shown in Figure 3-2 (page 3-5). These land uses include:

- Aircraft operations and maintenance
- Industrial





- Administrative
- Community (commercial)
- Community (service)
- Medical
- Housing (accompanied)
- Housing (unaccompanied)
- Outdoor recreation
- Open space
- Airfield
- Water
- Restricted land-use areas

Land uses at the proposed site would be governed by the location of the aircraft parking apron, which would represent the largest land use at the installation. For the most part, land uses in the C-17 beddown area would be comprised of airfield pavement areas, aircraft operations, and aircraft maintenance. The traditional land uses at the proposed site include:

- Safety zones and airfield clearance areas
- Airfield pavement areas
- Aircraft operations
- Maintenance facilities
- Industrial facilities
- Command and support facilities
- Special categories
- Open space

Aircraft maintenance activities and other flightline facilities are best sited adjacent to the proposed apron to facilitate direct and frequent interaction with the aircraft.

The functional relationships in the existing pattern of land use on EAFB have developed over time in response to the changing missions and facility needs. Most activities that require remote sites are located north of the airfield and away from the cantonment area. Most industrial activities are concentrated south of the airfield, and do not conflict with the north airfield area. On-base recreational facilities are located away from the more sensitive airfield land.

### 3.3 Coastal Zone Management

EAFB is divided into seven resource management units based on environmental, physical and/or social features such as watersheds, topography, land-use patterns, ownership, and roads. The only unit under coastal zone management is Unit 7, Coastal Mudflats. Within this unit, there may be areas of special concern that require special management activities.

The Coastal Mudflats (Unit 7) contains approximately 150 acres of shoreline that are within the coastal zone boundary managed by EAFB (USAF 3rd Wing, 2000). In addition to the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.) as amended through the Coastal Zone Act Reauthorization Amendments of 1990 and Public Law (P.L.) 104-150, the Coastal Zone Protection Act of 1996, this unit falls under other specific regulations,

including the Marine Protection, Research, and Sanctuaries Act (33 U.S.C. 1401 et seq.), the Marine Mammal Protection Act of 1972 (16 U.S.C. 1361 et seq.) as amended through 1997, and the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

Federal lands are excluded from coastal zone boundaries. However, all uses and activities that directly affect the coastal area must be consistent to the maximum extent practical with the Alaska Coastal Management Program (ACMP) and they are subject to the consistency provisions of Section 307 of the Coastal Zone Management Act of 1972, as amended (16 U.S.C. 1451 et seq.). The “Integrated Natural Resources Management” implementation (AFI 32-7064, USAF, 1994b) directs that bases with coastal or marine properties must enter into an agreement with the Coastal America National Implementation Team to assist in the restoration and protection of coastal areas.

The USAF has a Memorandum of Understanding with Coastal America (Coastal America, 1992) to perform the following:

- Protect, preserve, and restore the nation’s coastal ecosystems through existing federal capabilities and authorities
- Collaborate and cooperate in the stewardship of coastal living resources by working together and in partnership with other federal programs
- Provide a framework for action that effectively focuses expertise and resources on jointly identified problems to produce demonstrable environmental and programmatic results that may serve as models for effective management of coastal living resources

The proposed C-17 beddown location on the north ramp is not within the 150 acres of shoreline that are within the coastal zone boundary managed by EAFB (USAF 3rd Wing, 2000).

## 3.4 Biological Resources

### 3.4.1 Definition of Resource

Biological resources present at EAFB are primarily those natural floral and faunal ecosystems generally found in the northern areas of the installation. These resources include the vegetation and wildlife supported by birch/white spruce and cottonwood forests; aspen/white spruce forests; wetlands; lakes, ponds, and streams; and coastal ecosystems.

Within the cantonment and other developed sections of EAFB, some areas are landscaped with grass and ornamental trees. These developed areas support small birds and mammals and other urbanized species.

### 3.4.2 Regional Setting

The Anchorage vicinity is within the Pacific Mountain and Valleys region of western North America. The area is a low-coastline delta from the Susitna and Matanuska Rivers draining into Cook Inlet and surrounded by the Alaska Mountain Range. EAFB is located on a low plain at the base of the Chugach Mountains. The land is generally classified as lowland



spruce/hardwood forests within the coastal Cook Inlet Ecoregion of Alaska (Pearson et al., 2000).

### 3.4.3 Existing Conditions

#### 3.4.3.1 Vegetation

EAFB's floral composition is best described as a diverse mosaic of estuarine, inland wetland, and upland plant communities. The following physiographic zones of vegetation and plant habitats are found on EAFB:

- Coastal Halophytic Zone
- Lowland Interior Forest Zone
- Artificially Cleared or Disturbed Area Zone

The physiographic zones are further defined in the *Integrated Natural Resources Management Plan for Elmendorf Air Force Base* (USAF 3rd Wing, 2000) as:

- **Coastal Halophytic Zone.** Comprised of the shoreline and intertidal flats along Cook Inlet.
- **Lowland Interior Forest Zone.** Lowland boreal forest found to 1,500 feet elevation. Mesic to dry forest types include birch (*Betula papyrifera*), white spruce (*Picea glauca*), quaking aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and mixed birch/spruce forest. Wetlands include black spruce (*Picea mariana*) and treeless bogs with graminoid forbs. Alder (*Alnus* species [spp.]) is the dominant shrub community.
- **Artificially Cleared or Disturbed Area Zone.** Examples of these areas include the main cantonment area and airfield, roadsides, rights-of-way, and pipelines.

#### 3.4.3.2 Wetlands

Pursuant to the CWA (33 U.S.C. 1251 et seq.) Section 404 permitting process, the U.S. Army Corps of Engineers (COE) has been given the responsibility and authority to regulate the discharge of dredged or fill materials into waters of the United States, including wetlands. The COE uses the following definition of wetlands, which has been set forth by the COE, for administering the Section 404 permit program:

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetland habitats on EAFB include freshwater marshes, bogs, lakes and ponds, and riparian areas. Wetland vegetation types include open water, emergent vegetation, aquatic bed, and shrub types. Wetland types include wet herbaceous forbs, mesic and wet graminoid forbs, bryoid moss, and freshwater aquatic herbaceous types (USAF 3rd Wing, 2000).

#### 3.4.3.3 Wildlife

Wildlife found on the installation (excluding the shoreline of Cook Inlet's Knik Arm) includes large and small mammals, raptors, waterfowl, passerine birds, and fish. While

Knik Arm is not part of the installation, the presence of marine mammals in Knik Arm and Cook Inlet is important to operations at EAFB.

Terrestrial mammals include moose (*Alces alces*), black bears (*Ursus americanus*), coyote (*Canis latrans*), beaver (*Castor canadensis*), snowshoe hare (*Lepus americanus*), porcupine (*Erethizon dorsatum*), and other small mammals. Those most likely to be observed in the developed Proposed Action area include red squirrels (*Tamiasciurus hudsonicus*), porcupines, and bats (*Myotis* spp.). Moose may stray into the cantonment area to graze and bears will raid garbage cans if the containers are not bear-proof. The birds most likely to be found in the cantonment area and the general Proposed Action area are urbanized species such as the common raven (*Corvus corax*), American robin (*Turdus migratorius*), sparrows (Emberizidae), and chickadees (*Poecile* spp.). Redtail hawk (*Buteo jamaicensis*) and bald eagles (*Haliaeetus leucocephalus*) are raptors common to Alaska and the vicinity of the Proposed Action. Marine mammals present in Knik Arm include the Cook Inlet sub-population of beluga whale, which is protected under the Marine Mammal Protection Act (16 U.S.C. 1361 et seq.) as amended through 1997.

Waterfowl commonly use the ponds, lakes, and streams on EAFB. Species commonly noted include Canada geese (*Branta canadensis*), mallard ducks (*Anas platyrhynchos*), red-necked grebes (*Podiceps grisegena*), and loons (*Gavia* spp.).

All five Pacific salmon species are known to spawn in one or more of the streams on EAFB. Ship Creek and Six Mile Creek are the primary anadromous streams on EAFB. Rainbow trout (*Salmo gairdneri*) are found in several of the EAFB lakes, either from natural spawning or stocked populations.

#### 3.4.3.4 Threatened and Endangered Species

As stated in the *Integrated Natural Resources Management Plan* (USAF 3rd Wing, 2000), no federally listed threatened or endangered species currently inhabit EAFB. There are two raptors with special status considerations. The American peregrine falcon (*Falco peregrinus anatum*), once listed as threatened, has been delisted (August 25, 1999; 64 Federal Register [FR] 46541) and is being monitored by the U.S. Fish and Wildlife Service (USFWS) (December 3, 2003; 68 FR 67698). The bald eagle, also once listed, is common throughout the Proposed Action area. It is protected under state and federal laws (Bald Eagle Protection Act; 16 U.S.C. 668a-668c).

## 3.5 Water Resources

### 3.5.1 Definition of Resource

Water resources are defined as the supply of water in a given area described in terms of availability of surface and underground water.

### 3.5.2 Existing Conditions

EAFB has numerous water resources, including lakes, streams, ponds, wetlands, and two aquifers. Approximately 1,537 acres of EAFB's 13,130 acres are lakes, ponds, or wetlands. Most of the installation's large water resources are located north of the Main Base Area in a

largely undeveloped area. There are four major hydrologic drainage systems on EAFB, including Ship Creek, Six Mile Creek, EOD Creek, and Cherry Hill Ditch.

### 3.5.2.1 Surface Water

There are three streams, one major storm drainage ditch, and some lakes on EAFB. These drainage areas and some lakes are depicted in Figure 3-3 (page 3-13). The U.S. Geological Survey (USGS) watershed areas for these surface waters (USAF 3rd Wing, 2000) are:

- Ship Creek
- Six Mile Creek
- EOD Creek
- Cherry Hill Ditch
- Kettle Lakes

Figure 3-3 (page 3-13) shows the EAFB watershed.

Ship Creek is an important local stream, and is the third largest recreational fishery in Alaska after the Kenai and Russian Rivers (Kent, 2001). The Ship Creek headwaters are located within the Chugach State Park beginning at an elevation of 5,100 feet, from which the stream flows west through the southern edge of EAFB for approximately 4.2 miles. Ship Creek drains approximately 5,000 acres of EAFB property. The entire Ship Creek watershed encompasses 117 square miles (75,000 acres), and the entire main channel is approximately 29 miles long. Ship Creek's channel is approximately 20 feet wide and 2 feet deep. The stream bottom is rocky and gravelly, with an average slope of 3 percent. Flow in Ship Creek is seasonally influenced, but averages 144 cubic feet per second (cfs). Flow is generally highest during spring runoff and is lowest during late winter. There are portions of Ship Creek that experience no-flow on the surface during the late winter.

Six Mile Creek, another stream that flows through EAFB property, serves as a drainage area for approximately 2,000 acres. This stream system is comprised of 1 mile of stream channel and 2 miles of manufactured lakes. Six Mile Creek is fed by natural springs that originate near the border between EAFB and Fort Richardson. The average flow in the stream section is 3 cfs, and the stream is approximately 5 feet wide and 10 inches deep.

EOD Creek is a smaller stream, 1 mile in length, which drains approximately 1,000 acres of the northern, undeveloped area of EAFB property. This stream originates from a wetland area, and its substrate consists of alternating sections of organic peat, silt, and gravel. Summertime flow in EOD Creek is approximately 0.75 cfs.

The Cherry Hill storm water ditch drains a majority of the more intensely developed areas of EAFB, including the flightline and the proposed site for the C-17 facilities. Flow in this ditch is dependent on storm water and snowmelt events, and varies from less than 1 to 3 cfs after heavy rainfall events. This area drains to the Cook Inlet.

There are 12 freshwater lakes and ponds on EAFB. These water bodies range from 1 to 123.9 acres in surface area.

EAFB has approximately 8 miles of shoreline bordering the Knik Arm of the Cook Inlet. This saltwater body has extreme tidal variation, which has created a muddy tidal zone with very little vegetation.

EAFB maintains compliance with its National Pollutant Discharge Elimination System Multi-Sector General Permit (USAF 3rd Wing Public Affairs, 2004) for protection of surface water by non-point source pollutants. Surface water is also protected by measures outlined in EAFB's Storm Water Pollution Prevention Plan (SWPPP), which has identified potential pollutant sources and relevant best management practices (BMPs) to reduce the potential for pollution of receiving waters (EAFB, 2001a). In addition to the EAFB SWPPP, any new construction projects on EAFB that would affect more than 1 acre are required to develop a project-specific SWPPP, implement BMPs, and notify the EPA about the project.

### 3.5.2.2 Groundwater and Wells

EAFB is underlain by two ground water aquifers. The first is a shallow, unconfined aquifer, while the second is a deeper, confined aquifer. These aquifers are separated by the Bootlegger Cove formation, which acts as a confining layer and keeps the deeper aquifer isolated.

Groundwater movement in the shallow aquifer generally mimics surface water flow, which flows towards the northwest along the north limb of the moraine, and to the southwest along the south limb of the moraine. This aquifer generally exists between 10 to 50 feet below ground surface (bgs). The historically high groundwater elevation in the immediate vicinity of the C-17 beddown area is approximately 165 feet mean sea level (MSL), or about 30 feet bgs. Shallow groundwater in the C-17 beddown area contains elevated concentrations of chlorinated solvents and fuel-related compounds (USAF 3rd Wing Public Affairs, 2004). EAFB environmental managers expect that this shallow aquifer will be free of contamination within 20 years. Approximately 26 monitoring wells in this area are used to monitor groundwater elevations and contaminant concentrations. This aquifer is not currently used as a water supply.

The deeper aquifer underlies all of EAFB. Water movement in this confined aquifer tends to flow from the Chugach Mountains west towards the Knik Arm of the Cook Inlet. This confined, deep aquifer serves as a standby source of drinking water for EAFB. The main source of drinking water for EAFB is supplied by Fort Richardson. The Fort Richardson water treatment plant draws surface water from Ship Creek and filters and treats the water before it is delivered to EAFB through four water mains.

## 3.6 Air Quality

### 3.6.1 Definition of Resource

Air quality was identified by the USAF as an issue of concern and is being addressed in this EA. Ambient air quality is determined by the individual concentrations of seven pollutants in air that can be breathed by the general public. The seven pollutants evaluated by EPA to determine ambient air quality are:

- Carbon monoxide (CO)
- Nitrogen oxides (NO<sub>x</sub>)
- Sulfur dioxide (SO<sub>2</sub>)
- Particulate matter equal to or less than 10 microns in diameter (PM<sub>10</sub>)
- Particulate matter equal to or less than 2.5 microns in diameter (PM<sub>2.5</sub>)

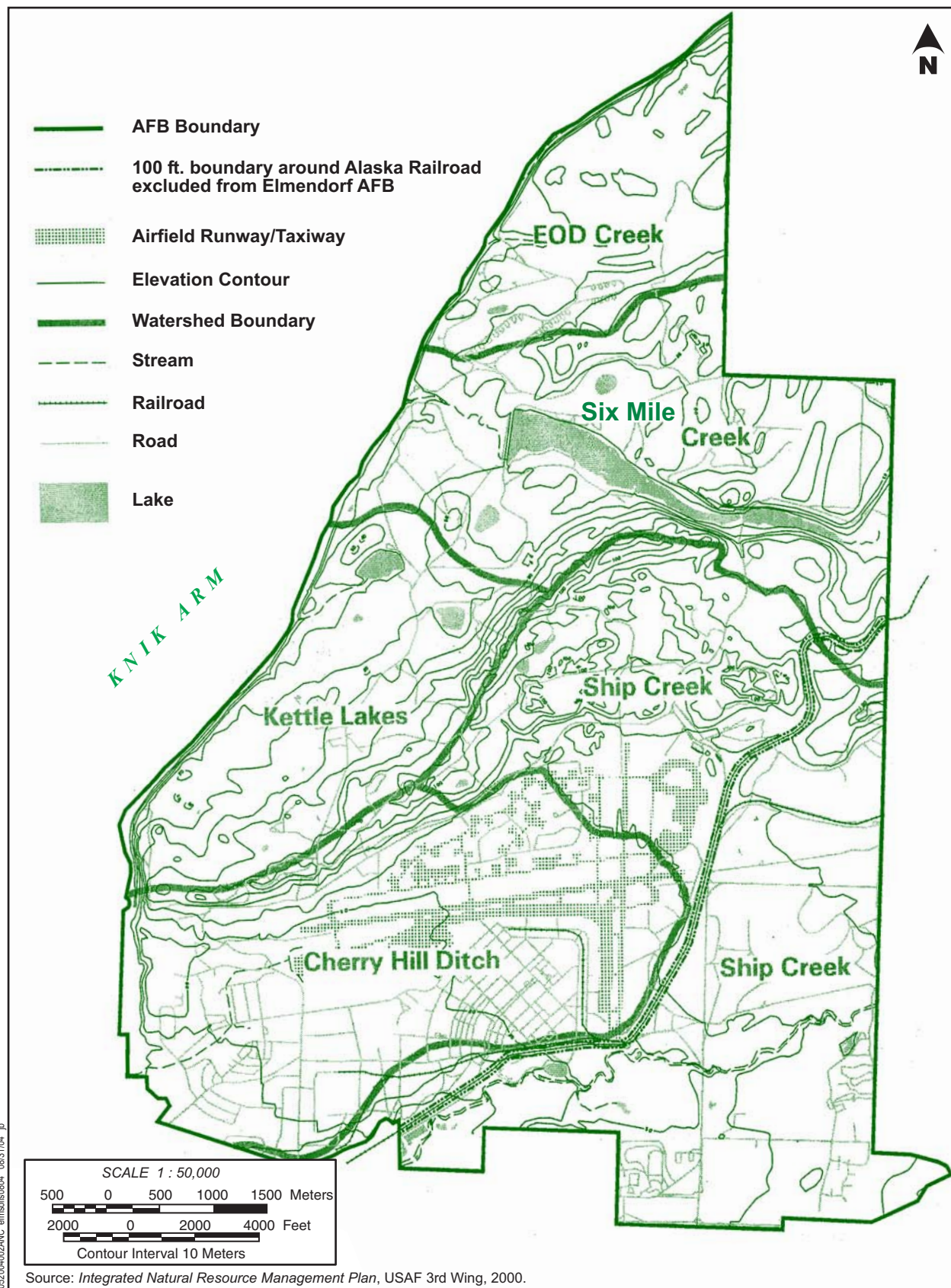


Figure 3-3  
**Elmendorf Air Force Base Watershed**  
 C-17 Beddown Environmental Assessment  
 Elmendorf Air Force Base, Alaska

- Ground level ozone
- Lead

The EPA has established atmospheric concentration limits for these seven pollutants. These limits are referred to as National Ambient Air Quality Standards (NAAQS) and pollutant levels that are protective of public health and welfare. These standards are presented in Table 3-1.

Due to elimination of lead in gasoline and the absence of lead-emitting sources in the Anchorage airshed (such as copper and lead mines or processing operations), lead emissions are not a factor in this assessment. Ground-level ozone is not directly emitted to the air. Rather, ozone is a product of the chemical reaction of NO<sub>x</sub> and/or volatile organic compounds (VOCs) and sunlight. Because emissions of NO<sub>x</sub> and VOCs lead to the formation of ground-level ozone, NO<sub>x</sub> and VOCs are referred to as ozone precursors. As a result, ozone formation is controlled by controlling the emissions of NO<sub>x</sub> and VOCs.

The primary strategy for achieving and maintaining the NAAQS is controlling the emissions of pollutants. These pollutants are defined as the following criteria pollutants:

- CO
- NO<sub>x</sub>
- SO<sub>2</sub>
- PM<sub>10</sub>
- PM<sub>2.5</sub>
- VOCs
- Lead

Because NAAQS and criteria pollutants are the primary standards that the EPA uses for evaluating and improving air quality in the United States, these standards will be used to assist in describing the affected environment and any environmental consequences resulting from the implementation of the Proposed Action.

## 3.6.2 Existing Conditions

This section describes the current air quality and meteorological environment of EAFB. The existing climate of EAFB, existing local air quality for the Municipality of Anchorage, and current air emissions from EAFB are discussed in this section.

### 3.6.2.1 Climate

EAFB is located on a lowland plain at the base of the Chugach Mountains. The climate in the Proposed Action area is characterized as representative of the maritime zone of south-central Alaska, with moderate temperatures in both winter and summer. Mean annual precipitation is approximately 16 inches (Western Regional Climate Center [WRCC], 2002).

TABLE 3-1

Federal and State of Alaska National Ambient Air Quality Standards  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Pollutant	Averaging Time	Primary (Health)	Secondary (Welfare)
Particulate matter less than 2.5 microns in diameter (PM <sub>2.5</sub> )	Annual arithmetic mean	15.0 µg/m <sup>3</sup>	15.0 µg/m <sup>3</sup>
	24 hours	65 µg/m <sup>3</sup>	65 µg/m <sup>3</sup>
Particulate matter less than 10 microns in diameter (PM <sub>10</sub> )	Annual arithmetic mean	50 µg/m <sup>3</sup>	50 µg/m <sup>3</sup>
	24 hours	150 µg/m <sup>3 a</sup>	150 µg/m <sup>3 a</sup>
Ozone	1 hour	0.12 ppm <sup>a</sup>	0.12 ppm <sup>a</sup>
Carbon monoxide (CO)	8 hours	9 ppm <sup>b</sup>	N/A
	1 hour	35 ppm <sup>b</sup>	N/A
Sulfur dioxide (SO <sub>2</sub> )	Annual arithmetic mean	0.03 ppm <sup>a</sup>	N/A
	24 hours	0.14 ppm <sup>b</sup>	N/A
	3 hours	N/A	0.5 ppm <sup>b</sup>
Nitrogen oxides (NO <sub>x</sub> )	Annual arithmetic mean	0.053 ppm	0.053 ppm
Lead	Calendar quarter average	1.5 µg/m <sup>3</sup>	1.5 µg/m <sup>3</sup>

Source: National Primary Ambient Air Quality Standards (40 CFR 50.4-50.12)

<sup>a</sup> Not to be exceeded.

<sup>b</sup> Not to be exceeded more than once per calendar year.

<sup>c</sup> Not to be exceeded more than one day per calendar year.

µg/m<sup>3</sup> = micrograms per cubic meter

N/A = not applicable

ppm = parts per million

The average annual high temperature is 42.1 degrees Fahrenheit (°F), the average annual low temperature is 28.6 °F, and the mean average annual air temperature is 35.3 °F (WRCC, 2002). Summertime highs average in the low- to mid-60s, and wintertime lows average in the low- to mid-single digits (WRCC, 2002).

Due to the combined influences of Cook Inlet and the mountainous topography surrounding Anchorage, EAFB enjoys a transitional climate. Because of the moderating effects of both maritime and continental climates, extreme weather conditions are not usually experienced in Anchorage.

Prevailing airflow in Anchorage is from the southeast and southwest, depending on the season. Surface winds during two-thirds of the year, from September to April, are predominately from the north. These north winds are the result of shallow, relatively dense cold air masses that periodically displace upward the warmer, less dense southerly flow.

Winds in the Anchorage area are generally not severe, except that localized channeling effects brought about by topographic features can result in greatly accelerated wind speeds. The southerly winds in the winter months, channeling out of Turnagain Arm, are usually more severe than the northern cold dense air mass movements.

Winds in Anchorage are generally light. Prevailing winds are from the north to northeast from September through April and from the south to southwest from May through August. However, on several days each winter, northerly winds up to 78 knots affect the entire Anchorage area. Also during the winter, there are about eight occurrences of very strong southeast winds that affect only the east side of Anchorage and the slopes of the Chugach Mountains. These winds occur more often above the 800-foot elevation in the Chugach Mountains, where winds are funneled through creek canyons.

### 3.6.2.2 Local Air Quality

The Municipality of Anchorage presently meets both the primary and secondary NAAQS standards for all pollutants and for all time periods except for the CO 8-hour standard of 9 parts per million (ppm). In order to be considered in attainment of the CO standard, this concentration is not to be exceeded more than once per year at a single monitoring station. The second exceedance in the same calendar year at a single monitoring location is considered a violation. Violations in the Anchorage area usually occur during periods of stagnant air conditions, when pollutants build up under a temperature inversion. This typically occurs in winter months. The southern boundary of EAFB forms the northern boundary of the CO attainment maintenance area and is not included in the CO attainment maintenance area. It should be noted that the northernmost CO monitoring station in the Municipality of Anchorage, located near the southern boundary of EAFB, has not recorded a CO exceedance since 1990. As such, CO monitoring at this station has been discontinued since 1995.

Actions by the State of Alaska and the Municipality of Anchorage have significantly reduced emissions of CO in the Anchorage area. Table 3-2 presents the total exceedances and violations of the 8-hour CO standard reported for the Anchorage bowl between 1998 and 2001.

Since there have been no violations of the CO NAAQS in the Anchorage area in recent years, the Municipality of Anchorage has been redesignated by the EPA as an attainment area requiring a maintenance plan for attainment status of CO. This means that even though the Municipality of Anchorage has achieved attainment with the NAAQS for CO the EPA will require a continuing demonstration that the area can maintain attainment status. Assuming no future violations, designation as a maintenance area would continue for an undetermined length of time before the Municipality of Anchorage would officially be designated as an attainment area for CO.

### 3.6.2.3 Current Emissions

Air emissions from EAFB result from two different types of sources, stationary and mobile. Examples of stationary sources are boilers in hangars, office buildings, and on-base housing. Examples of mobile sources are mobile generators, privately- and government-owned vehicles, and aircraft.



**TABLE 3-2**

History of Exceedances and Violations of the 8-Hour Carbon Monoxide Standard, Anchorage, Alaska  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Year	Number of Exceedances	Number of Violations
1998	1	0
1999	1	0
2000	0	0
2001	1	0

Source: Municipality of Anchorage Air Quality Program, Environmental Services Division, Department of Health and Human Services, *Year 2000 Anchorage Carbon Monoxide Attainment Plan*, September 25, 2001

**Stationary Emissions** EAFB is considered to be a major source of air contaminants since it has the potential to emit a criteria pollutant in excess of 250 tons per year. Usually an AFB is treated as a single facility when it is required to obtain a Title V Permit. A different permitting strategy was utilized when permitting EAFB. For purposes of Title V permitting, EAFB has been divided into nine different facilities based on their industrial classifications rather than on their collective ownership and control by EAFB. These nine facilities are listed in Table 3-3.

**TABLE 3-3**

Elmendorf Air Force Base Facilities  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

SIC Code	SIC Title
45	Transportation by air (flightline operations)
48	Communications
49	Electric and gas utility services (Central Heat and Power Plant)
65	Real Estate (housing)
75	Automotive repair and gasoline service stations (non-Army and Air Force Exchange Service)]
80	Health services (hospital and clinics)
87	Engineering, accounting, research, management, and related services
92	Justice, public order, and safety (fire and police)
97	National security (military weapons)

Only three of the nine facilities have potential criteria pollutant emissions that are large enough to require Title V permits. The three facilities requiring Title V permits are listed in Table 3-4.

**TABLE 3-4**  
 Elmendorf Air Force Base Title V Permits  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Facility Name	Title V Permit Number	Permit Issue Date
Central Heat and Power Plant	291TVP01A	February , 03, 2003
Elmendorf Hospital	291TVP01B	January, 31, 2003
Elmendorf Flightline	291TVP01C	January, 27, 2004

In addition to the three Title V permits, EAFB holds two separate Owner Requested Limits (ORLs) for equipment that are not included in the Title V permits. These ORLs are for Fire Protection Pumps and Road Painting.

The only EAFB facility/permit that would be affected by the C-17 beddown would be the EAFB flightline. The Central Heat and Power Plant would not be impacted by the C-17 beddown. Any new construction would have its own comfort heating source, and EAFB would be buying power off the electrical grid prior to the implementation of the C-17 beddown.

Potential emissions from the EAFB flightline were estimated for the year 2003. Potential emissions estimates assume that a given piece of equipment was operated at its maximum capacity for 24 hours a day, 365 days a year, if its operation is not limited by a permit condition or regulation. Because these assumptions are very conservative, they often overstate the pollutants a facility actually emits. The potential emissions from the EAFB flightline are presented in Table 3-5.

**TABLE 3-5**  
 Estimated Potential Criteria Pollutant Emissions from Elmendorf Air Force Base Flightline in 2003  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

CO	VOCs	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>
115	86	217	154	18
Source: "Elmendorf Air Force Base SIC Code 45 Transportation by Air Title V Permit Application," January 2003				
Note: All amounts in tons per year				

**Mobile Emissions** Mobile emissions from EAFB have not been apportioned to various functions. A mobile source inventory was conducted in 2002 to estimate emissions from mobile sources at EAFB. Estimated mobile emissions from EAFB are presented in Table 3-6.

**TABLE 3-6**

Estimated Mobile Source Emissions from Elmendorf Air Force Base in 2002  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>Emission Source</b>	<b>NO<sub>x</sub></b>	<b>CO</b>	<b>HC</b>	<b>PM<sub>10</sub></b>	<b>SO<sub>x</sub></b>
Aircraft Based at Elmendorf AFB (952')	365.84	288.17	84.97	79.7	49.64
Aircraft Based at Elmendorf AFB (1,908')	529	352.78	94.75	143.98	59.42
Transient Aircraft (952')	48.73	140.89	51.83	14.68	6.4
Transient Aircraft (1,908')	72.49	150.48	43.23	16.95	7.79
On-Wing Engine Testing	16.77	0.74	0.18	0.49	0.48
Aerospace Ground Support Equipment	175.28	24.71	7.95	5.31	1.25
Non-Road Non-Vehicle Equipment	0.33	8.3	3.01	0.04	0
Government-Owned Vehicles	12.73	63.12	7.22	11.7	0.72
Privately-Owned Vehicles	33.2	366.78	23.71	214.58	3.06
<b>Total Emissions 952' Scenario (tons/year)</b>	<b>652.88</b>	<b>892.71</b>	<b>178.87</b>	<b>326.5</b>	<b>61.55</b>
<b>Total Emissions 1,908' Scenario (tons/year)</b>	<b>839.8</b>	<b>966.91</b>	<b>180.05</b>	<b>393.05</b>	<b>72.72</b>

Source: U.S. Air Force, Institute for Operational Health, Air Quality Branch, Environmental Analysis Division, 2002  
*Mobile Source Air Emissions Inventory for Elmendorf AFB-Draft Report*, December 2003

Notes: All results in tons per year

The 952' and 1,908' levels refer to the atmospheric mixing zones for Elmendorf AFB. The atmospheric mixing zone height is the ceiling height of the layer of the earth's atmosphere where chemical reactions of pollutants can ultimately affect ground level pollutant concentrations. The atmospheric mixing zone height is also known as the height of the inversion layer. According to the EAFB weather service, during 2002 the lowest average mixing zone height was 952 feet, which occurred from October through December. The highest average mixing zone height was 1,908 feet, which occurred from April through June.

## 3.7 Airspace Management

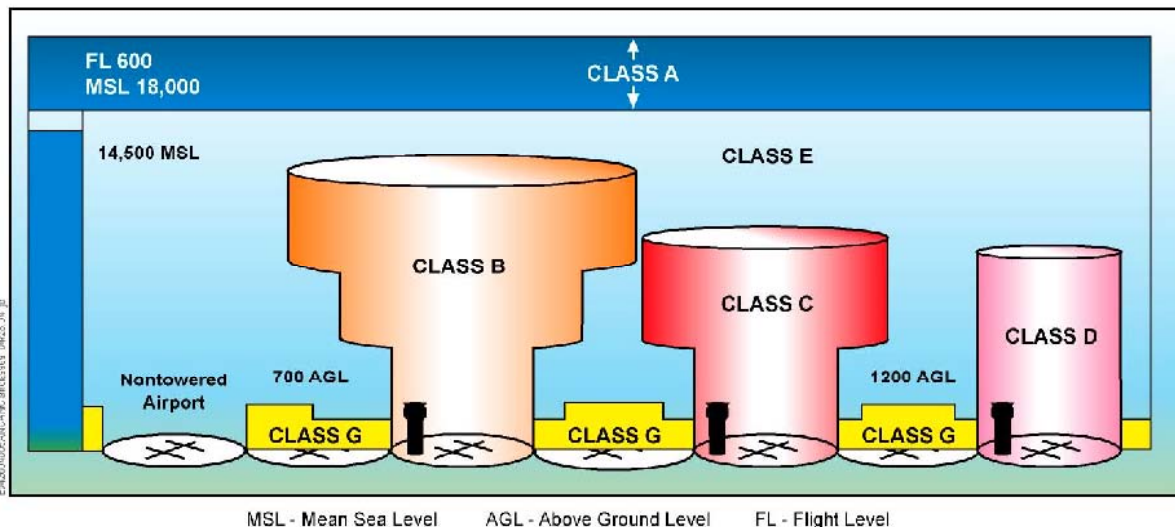
### 3.7.1 Definition of Resource

The FAA is the sole agency responsible for the management and control of the National Airspace System (NAS), a vast resource that consists of a collection of systems, procedures, facilities, aircraft, and people (National Airspace System Architecture Version 4.0; FAA, 1999a). The orderly and safe use of the NAS is essential for maintaining the safety of aircraft operations, reducing the frequency of delays, increasing the predictability of air traffic flows, and providing ease of access to the airspace and airports.

The airspace over the United States can be classified as either controlled or uncontrolled. Controlled airspace is that airspace within which all aircraft operators are subject to certain rating requirements, operating rules, and equipment requirements listed in FAA's "General

Operating and Flight Rules" (14 CFR Part 91). Generally, with a few exceptions, the controlled airspace in the United States and its territories is shown in Figure 3-4.

Figure 3-4  
Airspace Classes in the United States



Source: Federal Aviation Administration, *Aeronautical Information Manual*, 2000a.

The airspace designations are:

- **Class A Airspace.** All the airspace over the United States extending upward from 18,000 feet above MSL to and including 60,000 feet MSL. This also includes the airspace overlying the ocean within 12 NM of the United States' coastline. All aircraft operating in this airspace are required to operate under instrument flight rules (IFR), a system of rules for operating aircraft via instrument reference.
- **Class B Airspace.** This airspace surrounds the nation's busiest airports. It extends upward from the ground surface to 10,000 feet MSL. The geometry of each class B airspace area is individually tailored and consists of two or more layers. Aircraft are not allowed to operate in this airspace without Air Traffic Control (ATC) clearance in order to maintain proper separation between aircraft. Aircraft operating in this airspace can operate under either IFR or visual flight rules (VFR), a system of rules for operating aircraft via visual references such as landmarks on the ground.
- **Class C Airspace.** This airspace surrounds airports that have a certain level of aviation activity, an operational control tower, and TRACON services. TRACONs are the primary facilities operated by the FAA to ensure safe aircraft operations during their climb and descent near major airports. Class C airspace consists of an inner 5 NM radius circle extending upward from the ground surface to 4,000 feet above the airport elevation and an outer circle with a 10 NM radius extending from 1,200 feet to 4,000 feet above the airport elevation. Aircraft operating in this airspace must maintain two-way radio communication with the ATC facility.

- **Class D Airspace.** The configuration of this airspace is individually tailored to accommodate any published instrument procedures and other needs of the airports it surrounds. This airspace extends upward from the ground surface to 2,500 feet above the airport elevation and surrounds airports that have an operating tower. Aircraft operating in this airspace must establish and maintain two-way radio communication with the ATC facility.
- **Class E Airspace.** Typically, class E airspace consists of all the airspace extending upward from 14,500 feet MSL to, but not including, 18,000 feet MSL, and also the airspace above 60,000 feet MSL. Class E also includes the airspace overlying the ocean within 12 NM of the United States' coastline. However, there are some exceptions to this general rule. In some places, class E airspace extends downward to the surface of the airport where it is configured to contain all instrument procedures (such as at small general aviation airports). There are also some class E airspace areas that serve as extensions to class B, class C, and class D surface areas for an airport. Other exceptions to this rule are described in FAA Order 7400.2E (Procedures for Handling Airspace Matters; FAA, 2000b).
- **Class F Airspace.** This is an international airspace classification that is not utilized in the United States.
- **Class G Airspace.** This uncontrolled airspace has not been classified as listed above.

There are also certain activities that must be confined within defined geographic boundaries because of their nature (e.g. use of live ammunition for military training purposes). Limitations are imposed upon aircraft that are flying through such areas but are not part of those activities. Such areas are referred to as Special Use Airspace. Special Use Airspace areas can be designated as follows:

- **Military Operations Areas.** These are areas with defined geographical and vertical boundaries within which military aircraft can perform acrobatic maneuvers, high-speed low altitude flight, and other types of training.
- **Restricted Areas.** These are areas with defined geographical and vertical boundaries as well as specific hours of operation in which there are activities that pose significant hazard to aircraft that are not participating in the activity. Such hazards include artillery firing, aerial gunnery, or use of guided missiles.
- **Warning Areas.** These are areas with defined geographical and vertical boundaries located over open water more than 3 NM from the United States' coastline within which military aircraft can perform acrobatic maneuvers, high-speed low altitude flight, and other types of training. There is one Warning Area in Alaska located in the Gulf of Alaska (W-612).

### 3.7.2 Existing Conditions

The Municipality of Anchorage area is home to a dense aviation infrastructure. There are several publicly-owned public-use airports, United States government-owned airports, privately-owned non-public use airports, seaplane bases, and heliports as well as a diverse mix of general aviation, commercial, and military aircraft. At least 20 airports exist within

the boundaries of the Municipality of Anchorage. Four of them are high activity airports with arrival and departure paths that frequently overlap. These airports are the Ted Stevens Anchorage International Airport, Lake Hood Seaplane Base, Merrill Field, and EAFB.

The airspace over Anchorage is referred to as the Anchorage Terminal Area airspace. The types of facilities that provide air traffic services to airspace users in the Anchorage area are Automated Flight Service Stations (AFSS), Air Traffic Control Tower (ATCT), TRACON, and an Air Route Traffic Control Center. Their functions are as follows:

- **AFSS.** This facility provides a variety of services, including pilot weather briefings, en route communications, VFR search and rescue services, assistance to lost aircraft and aircraft in emergency situations, relaying ATC clearances, originating Notices-To-Airmen (NOTAMs), broadcasting aviation weather and NAS information, receiving and processing flight plans, and monitoring navigational aids (NAVAIDs). The Anchorage area is served by an AFSS located in Kenai, which is approximately 65 air miles south of Anchorage.
- **ATCT.** These facilities manage and control the airspace within a 5-mile radius of an airport. This includes control over ground operations on taxiways and runways and departing and landing traffic.
- **TRACON.** This facility provides radar services to aircraft within a 35 NM radius of Anchorage. These services cover aircraft arriving to and departing from the Ted Stevens Anchorage International Airport, Lake Hood Seaplane Base, Merrill Field, and EAFB. TRACON helps air traffic controllers establish and maintain separation of aircraft taking off, landing, and operating within the Anchorage area airspace.
- **Air Route Traffic Control Center.** This is one of only 21 such facilities in the United States. This center provides ATC services to aircraft operating on IFR plans.

Use of the Anchorage Terminal Area airspace is governed by procedures outlined in *Special Air Traffic Rules*, Federal Aviation Regulations (FAR) Part 93, Subpart D--Anchorage, Alaska, Terminal Area (FAA, 1963). The purpose of this FAR is to separate slower aircraft that use VFR from the high-performance aircraft using the Anchorage International Airport and EAFB. The Anchorage Terminal Area is divided into six segments (FAA, 2002c) as shown in (Figure 3-5, page 3-25). These are:

- International Segment
- Merrill Segment
- Lake Hood Segment
- Elmendorf Segment
- Bryant Segment
- Seward Highway Segment

Each segment has a set of special rules that govern aircraft operating procedures and operating altitudes. Figure 3-6 (page 3-27) outlines the altitude restrictions noted in 14 CFR 93 (FAA, 1963). These segments contain the following airspace classes:

- **Class A Airspace.** This is the airspace over Anchorage extending upward from 18,000 feet above MSL to and including 60,000 feet MSL.

- **Class B Airspace.** There is no class B airspace over Anchorage.
- **Class C Airspace.** This is the airspace contained within the boundaries of the International segment of the Anchorage Terminal Area.
- **Class D Airspace.** This is the airspace contained within the boundaries of the Elmendorf, Lake Hood, and Merrill segments. These segments have operational towers located at EAFB, Ted Stevens Anchorage International Airport, and Merrill Field, respectively. However, when the tower at Merrill Field is closed, the airspace in the Merrill segment reverts to Class E airspace.
- **Class E Airspace.** This is the airspace contained within a 15 NM radius of the Anchorage ATC tower with a floor elevation of 700 feet above ground level (AGL). Outside this radius, it has a floor elevation of 1,200 feet AGL. This airspace also includes the Bryant and Seward Highway segments.
- **Class G Airspace.** This is the airspace below the floor of the class E airspace in Anchorage.
- **Restricted Area.** A restricted area (R-2203) is located at Fort Richardson and borders the Elmendorf segment to the north (Figure 3-5, page 3-25). R-2203 is utilized by military A-10 and C-130 aircraft that frequently fly low-level training missions. R-2203A and R-2203B are up to, but not including, 11,000 feet MSL and R-2203C is up to 5,000 feet MSL. There is also a drop zone/landing zone contained within R-2203.

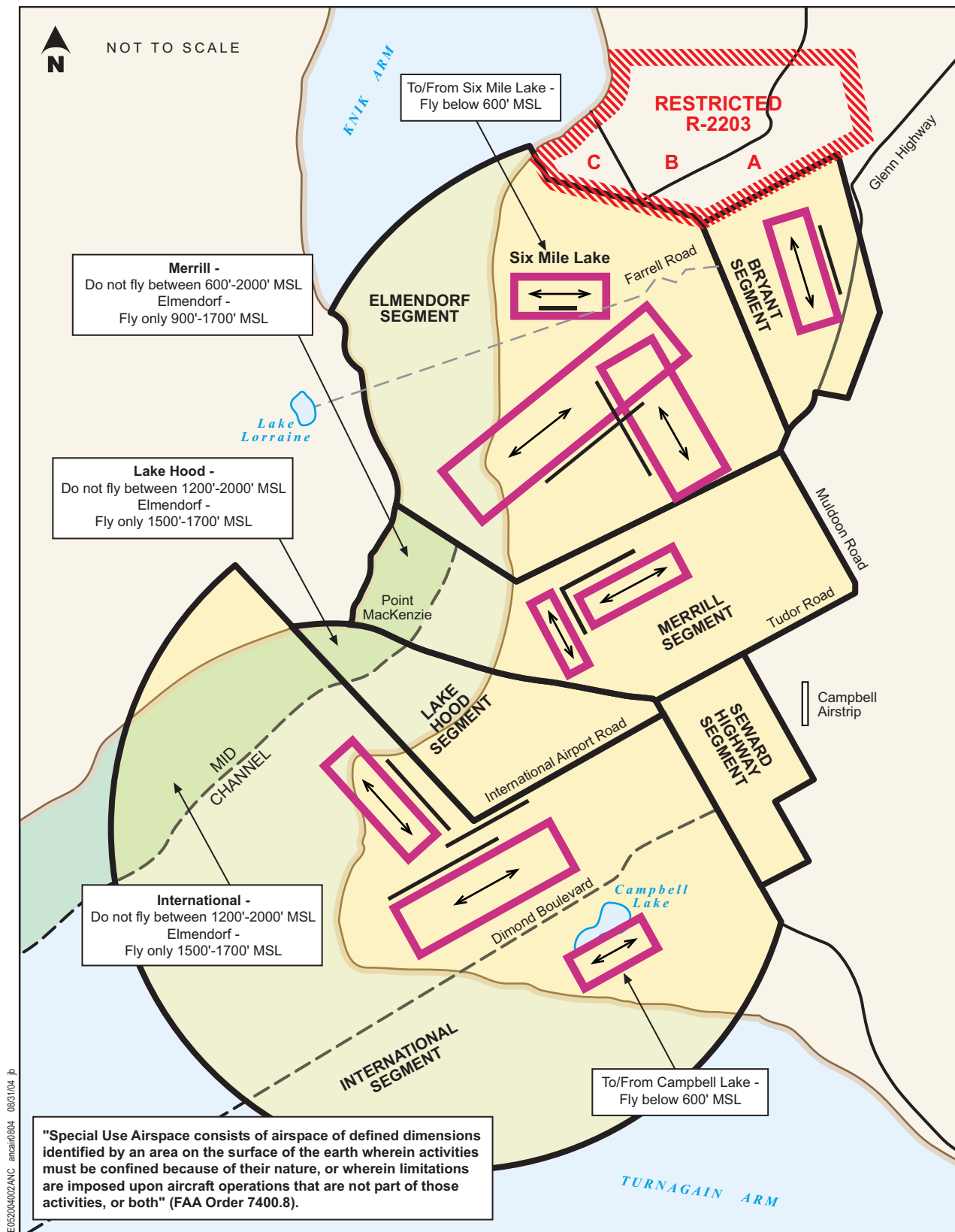
## 3.8 Noise

### 3.8.1 Definition of Resource

Noise is defined as unwanted sound and is one of the most common environmental issues associated with aircraft operations. Sound is a physical phenomenon consisting of minute vibrations, which travel through a medium, such as air, and are sensed by the human ear. Whether sound is interpreted as noise depends largely on the listener's subjective reaction. Such reaction is formed from the subject's current activity, past experience, and attitude toward the sound source.

Sound pressure is measured in units of micro Newtons per square meter ( $\mu\text{N}/\text{m}^2$ ) called micro Pascals ( $\mu\text{Pa}$ ). One  $\mu\text{Pa}$  is approximately one-hundred-billionth of the normal atmospheric pressure. The pressure of a very loud sound may be 200,000,000  $\mu\text{Pa}$ , or 10,000,000 times the pressure of the weakest audible sound (20  $\mu\text{Pa}$ ). Because of this wide range, expressing sound levels in terms of  $\mu\text{Pa}$  would be very cumbersome. For this reason, sound pressure levels (SPLs) are described in logarithmic units of ratios of actual sound pressures to a reference pressure squared. These units are called bels, named after Alexander G. Bell. In order to provide a finer resolution, a bel is subdivided into decibels (deci or tenth of a bel), abbreviated dB.

Since decibel is a logarithmic unit, SPLs cannot be added or subtracted by ordinary arithmetic means. For example, if one aircraft overflight produces an SPL of 70 dB at the

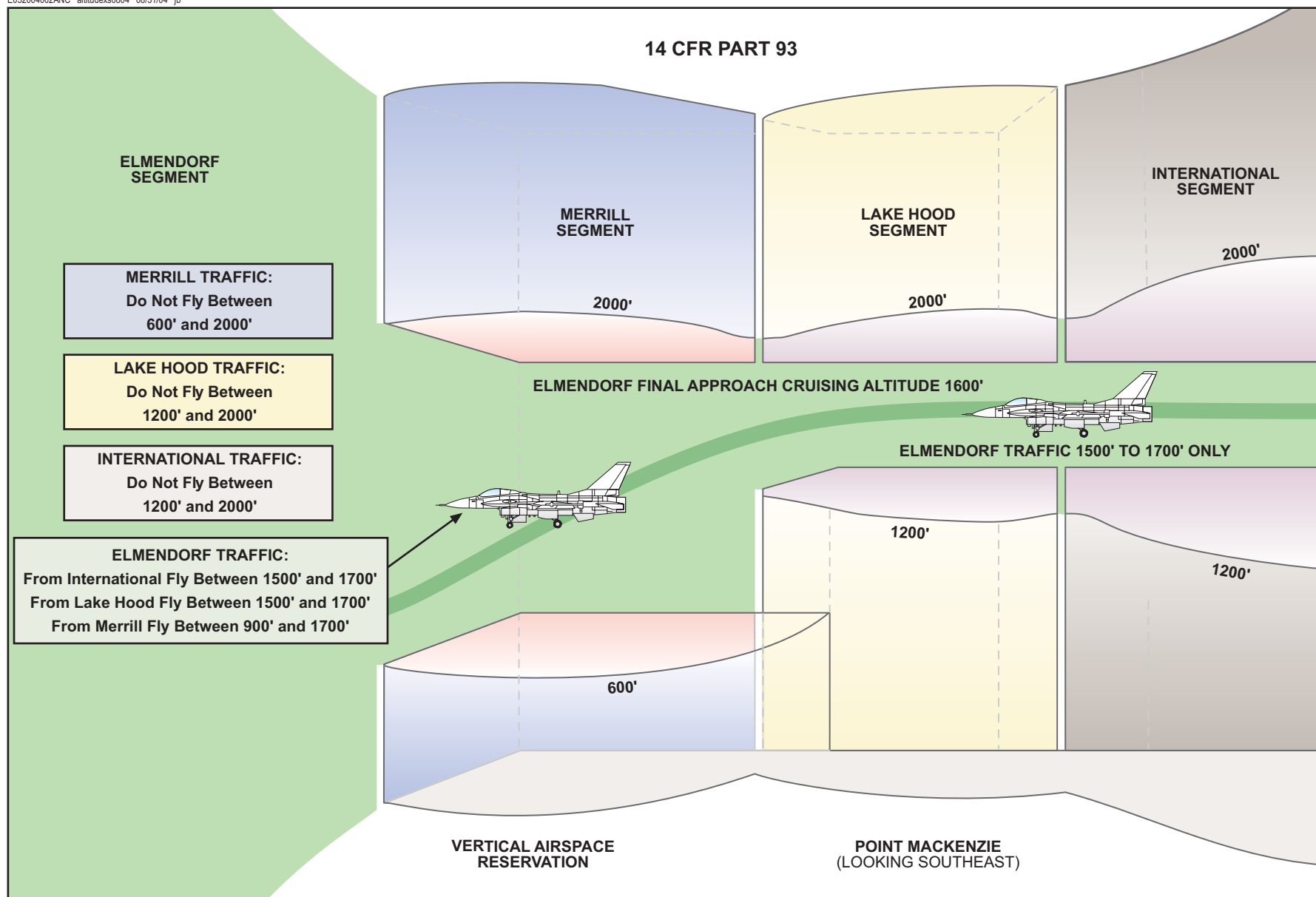


Source: Federal Aviation Administration, Anchorage Terminal Area: Airspace and Procedures Revision Project, 2002a

**Figure 3-5**  
**Anchorage Terminal Area Airspace Segments**

C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska





Source: Federal Aviation Administration, *Anchorage Terminal Area Pilot Bulletin*, 2002c

Figure 3-6

### Altitude Restrictions Outlined in 14 CFR Part 93

C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska

location of an observer, two aircraft passing simultaneously would not produce 140 dB. In fact, they would combine to produce 73 dB.

Unless otherwise stated, all sound levels reported in this EA are in A-weighted decibels (dBA). A-weighted sound level is defined as the level, in decibels, measured with a sound level meter having the metering characteristics and a frequency weighting specified in the American National Standards Institute Specification for Sound Level Meters, ANSI S 1.4-1983. The A-weighting de-emphasizes lower frequency sounds below 1,000 Hertz (1 kiloHertz [kHz]) and higher frequency sounds above 4 kHz. It emphasizes sounds between 1 kHz and 4 kHz. A-weighting is the most generally used measure for evaluation of environmental noise throughout the world. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

The actual impact of noise is not a function of loudness alone. The frequency, content, time of day during which noise occurs, and the duration of the noise are also important. The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, or dissatisfaction
- Interference with activities such as speech, sleep, or learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants typically experience noise effects in the last category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily due to the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to noise is by comparing it to the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise level, knowledge of the following relationships is helpful in understanding the human perception of changes in noise levels:

- Except in carefully controlled laboratory experiments, the human ear cannot perceive a change of 1 dB
- Outside the laboratory, a 3-dB change is considered a just-perceivable difference
- A change in level of at least 5 dB is required before a change in community response would be expected
- A 10-dB change is subjectively heard as approximately a doubling in loudness, and would generally cause an adverse community response

Table 3-7 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

TABLE 3-7

Typical Sound Levels Measured in the Environment and Industry  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Noise Source at a Given Distance	A-Weighted Sound Level, dBA	Noise Environments	Subjective Impression
Shotgun	140	Carrier flight deck	
Civil defense siren (100 feet)	130		
Jet Takeoff (200 feet)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 feet)	100		Very loud
Ambulance siren (100 feet)			
	90	Boiler room	
Freight cars (50 feet)		Printing press plant	
Pneumatic drill (50 feet)	80	Noisy restaurant	
Freeway (100 feet)			
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 feet)	60	Data processing center	
Air conditioning unit (100 feet)		Department store	
Light traffic (100 feet); rainfall	50	Private business office	
Large transformer (200 feet)			
Bird calls (distant)	40	Average living room library	Quiet
Soft whisper (5 feet); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		
	0		Threshold of hearing

Most noise events which last more than a few seconds present variable sound intensity. Consequently, a variety of noise metrics is used to measure noise levels. The noise descriptors most often used for aircraft noise impact assessment are the Maximum Noise Level ( $L_{\max}$ ), Sound Exposure Level (SEL), and Day-Night Average Noise Level (DNL).

$L_{\max}$  is the highest sound level measured during a single event in which the sound level changes value as a function of time (e.g., an aircraft overflight).  $L_{\max}$  is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during a noise event. Mathematically, SEL represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying noise event. Since aircraft overflights normally last longer than one second, the SEL of an overflight is usually greater than the  $L_{\max}$  of the overflight. SEL is a composite metric that represents both the intensity and duration of a noise event. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event.

DNL (or  $L_{dn}$ ) is the noise level descriptor used for the preparation of noise exposure contours and assessment of land-use compatibility around military facilities. The DNL is the equivalent sound level for an average busy day of aircraft operations with a penalty of 10 dB added to sound levels occurring during the nighttime (2200 to 0700 hours). Since the DNL noise exposure map presented in this report describes average busy day conditions, noise exposure on any given day may be higher or lower than indicated by the noise exposure map.

Additional information defining the noise environment is located in Appendix B.

### 3.8.2 Existing Conditions

Surface and air transportation vehicles are the main sources of environmental noise affecting the vicinity of EAFB and the Anchorage area in general. Besides military aircraft activity at EAFB, commercial and general aviation aircraft flights at the Ted Stevens Anchorage International Airport and, to a lesser extent, at Merrill Field result in exposure of local residents and workers to aircraft noise. Vehicular traffic on Glenn Highway, extending near the southeast boundary of EAFB, is a major source of surface transportation noise within areas located along the roadway. In April 2000, Air Force Center for Environmental Excellence (AFCEE) staff conducted a revalidation of EAFB's Air Installation Compatible Use Zone (AICUZ) study (EAFB, 1992). Figure 3-7 (page 3-33) depicts the DNL 65 dB, 70 dB, and 75 dB contours resulting from that study and the expected noise contours resulting from the Proposed Action. Land areas exposed to military aircraft noise levels of DNL 65 dB or higher are confined to areas within EAFB, within Fort Richardson, and over the Knik Arm of the Cook Inlet. Only a very small portion of off-base land in north Anchorage is exposed to noise levels near DNL 65 dB. All of the off-base area impacted by noise levels exceeding DNL 65 dB is over water in the Knik Arm of the Cook Inlet.

## 3.9 Safety

Many of the safety hazards that the USAF deals with cannot be completely eliminated because eliminating the hazard would compromise or reduce the effectiveness of the resources that are absolutely necessary for the USAF to complete its mission. However, conducting activities and missions in a safe manner is the number one priority in the USAF, and all practical methods and procedures are implemented to reduce and mitigate hazards that cannot be eliminated.

### 3.9.1 Definition of Resource

Safety in the USAF is divided into three functional areas. These functional areas are:

- Ground Safety
- Weapons/Explosives Safety
- Flight Safety

Each of these areas has specific hazards and risks that in turn require specific techniques and practices to manage and mitigate the associated hazards. Safety is focused on preventing the loss of human life, property, and equipment and preventing injury and damage to people, property, and equipment.

## 3.9.2 Existing Conditions

### 3.9.2.1 Ground Safety

Day-to-day operations and maintenance activities conducted by the 3rd Wing are performed in accordance with applicable USAF safety regulations, USAF Technical Orders, and standards prescribed by USAF Occupational Health and Safety requirements.

The 3rd Wing fire department provides fire and crash response at EAFB. The unit has a sufficient number of trained and qualified personnel and the required equipment to respond to both aircraft accidents and structural fires on EAFB.

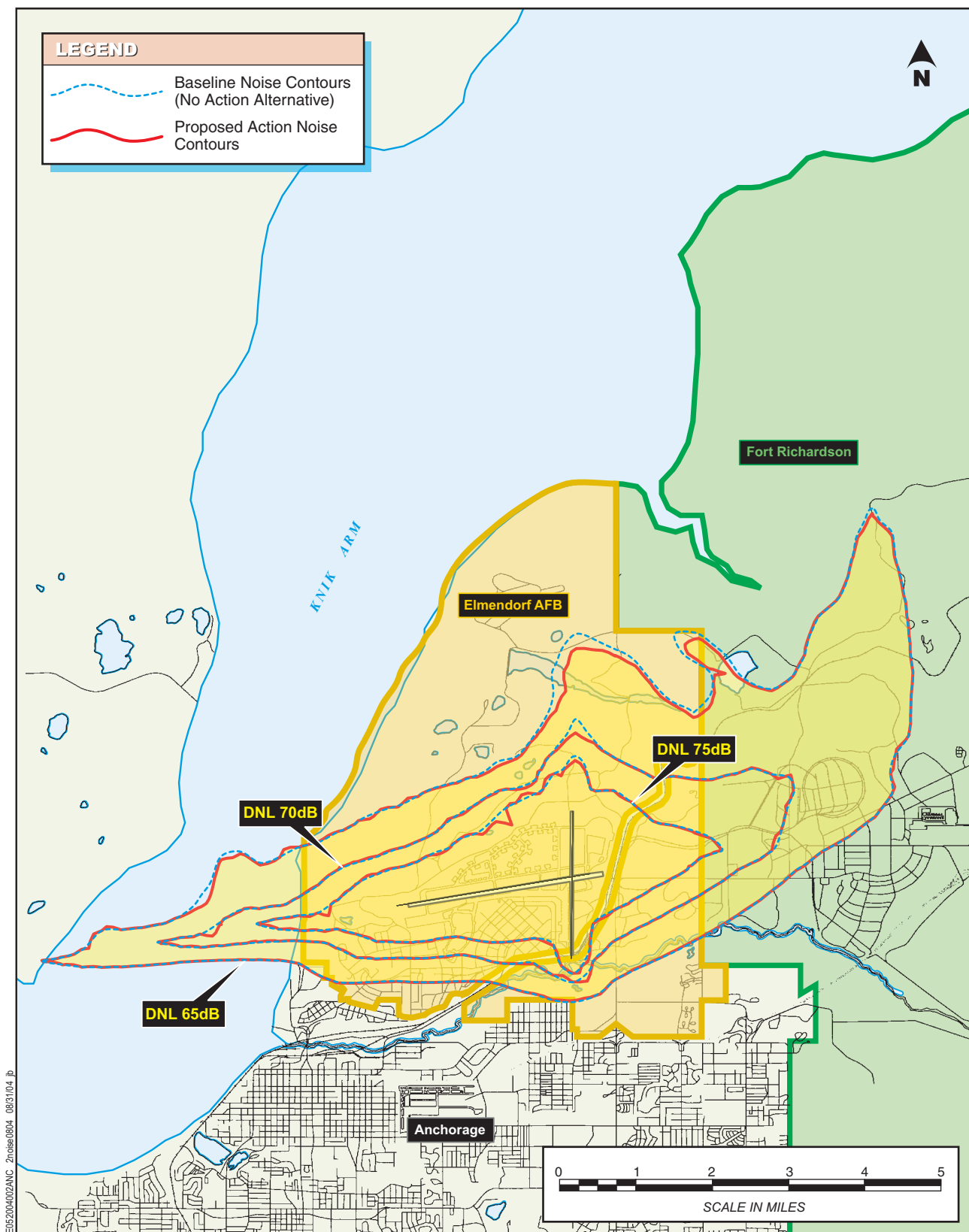
### 3.9.2.2 Weapons/Explosives Safety

The 3rd Wing controls, maintains, and stores all small arms, ordnance, munitions, and other explosives on EAFB. Ordnance and munitions are stored, handled, and maintained in accordance with AFI 91-201 (*Explosives Safety Standards*; USAF, 1998), appropriate technical orders, and other relevant instructions.

During shipment and receipt of ordnance and munitions from aircraft, several hot cargo pads can be activated for loading and unloading of cargo aircraft. When ordnance and munitions are being loaded or unloaded from cargo aircraft, the runway that the hot cargo pad is on or adjacent to is closed. Additionally, explosives transport activities from storage areas to the flightline are routed to avoid or minimize densely populated areas on EAFB. Storage of ordnance and munitions is also designed and planned to minimize the probability of a mishap involving explosives and, if a mishap does occur, to minimize the consequences.

### 3.9.2.3 Flight Safety

The 517th Airlift Squadron (ALS) currently operates 18 C-130H Hercules aircraft from EAFB. The 517th ALS has two major missions. The first is supporting airborne training for USARAK. The other mission is providing airlift support for the 11th Air Force. This includes fighter deployment and resupply of remote USAF facilities in Alaska. Elements and members of the 517th ALS may also be deployed in support of various contingency and similar operations. The 3rd Wing Safety Office is responsible for flight safety management at EAFB.



Accidents (mishaps) are grouped into four categories. Mishaps are defined in AFI 91-204 (*Safety Investigations and Reports*; USAF, 2004b).

- **Class A** mishaps occur when there is: a loss of life, permanent total disability, a cost totaling \$1 million or more, or destruction of an aircraft. Note: Destruction of an Unmanned Ariel Vehicle is not considered a Class A mishap unless the cost of the mishap equals or exceeds \$1 million or causes a loss of life or permanent total disability.
- **Class B** mishaps occur when there is: a cost totaling \$200,000 or more but less than \$1 million, permanent partial disability, or inpatient hospitalization of three or more personnel.
- **Class C** mishaps occur when there is: a cost totaling \$20,000 or more but less than \$200,000, a loss of worker productivity beyond the day or shift on which it occurred or occupational illness that causes loss of time from work at any time, or an occupational injury or illness resulting in permanent change of job
- **Class D** mishaps occur when there is: a cost totaling \$2,000 or more but less than \$20,000 or a nonfatal injury that does not meet the definition of a Class C and results in medical treatment greater than first aid and/or any occupational injury or illness reported on various forms.
- **Class E** events do not meet reportable mishap classification criteria, but are deemed important to investigate/report for mishap prevention such as Hazardous Air Traffic Report (HATR) events, High Accident Potential (HAP) events, Wildlife Strike (BASH) events, or other occurrences as directed in the discipline specific safety manuals (Air Force Manual [AFMAN] 91-22X).

Since the probability of an aircraft mishap is highest during takeoffs and landings, safety zones and corridors have been established for EAFB that are designed to reduce the number of injuries and lives lost and property damage on the ground due to an aircraft mishap. As a result, land uses such as schools, residential buildings, or hazardous materials storage facilities are restricted or prohibited in these areas. Three zones are designated to reduce the amount of damage on the ground resulting from an aircraft mishap:

- **Clear Zone.** A 3,000- by 3,000-foot area at the end of each runway. No construction or equipment storage is allowed in the Clear zone.
- **Accident Potential Zone I (APZ I).** This area extends 5,000 feet beyond the Clear Zone. Land uses that are prohibited in APZ I are uses such as petroleum refining and retail food trade. Automotive retail trade would be allowed in APZ I, but only after evaluation.
- **Accident Potential Zones II (APZ II).** This area extends 7,000 feet beyond APZ I and is less restrictive. Petroleum refining would be allowed. However, retail food trade would be allowed only after further evaluation.

Hospitals and schools would not be allowed in either APZ I or APZ II. Because APZ I and APZ II often are located outside of EAFB, the USAF does not always have the ability to prevent incompatible land uses in APZ I and APZ II. The USAF can and often does work with local planning and zoning entities to prevent or restrict incompatible land uses in APZ I and APZ II. This is the situation at EAFB. Residential housing has encroached into

APZ II for Runway 16-34. As a result, takeoff and landing patterns have been adjusted to minimize overflights of the community of Mountain View, a residential area within the Municipality of Anchorage. Similar adjustments to takeoff and landing patterns for Runway 06-24 have been made so that flights over Fort Richardson avoid population centers.

### 3.9.3 Bird-Aircraft Strike Hazards

Bird-Aircraft Strike Hazards (BASH) are a safety concern for all aircraft operations. Bird hazards exist on EAFB year-round, but the hazard increases in the spring and fall during migration. A collision between geese and an E3B Airborne Warning and Control System (AWACS) in September 1995, resulted in a crash that killed 24 people.

In order to minimize BASH, EAFB has implemented the following actions:

- BASH training for all EAFB personnel prior to the start of the spring and fall migration seasons
- Land management practices designed to make the flightline and other areas on EAFB less attractive to birds and other wildlife
- A warning system so that ground crews can immediately communicate BASH problems to departing or arriving aircraft
- When waterfowl are migrating, a wildlife detection and dispersal team is in operation 24 hours a day

In addition to the measures listed above, EAFB is evaluating a radar system designed to detect birds in landing and takeoff patterns from EAFB.

## 3.10 Transportation and Circulation

### 3.10.1 Definition of Resource

The roadway system for EAFB is designed for safe movement of vehicles with minimal congestion and delay. The roadway system is used to transport people, goods, and services into, out of, and around the installation. Figure 3-8 (page 3-37) shows the following types of roads at EAFB:

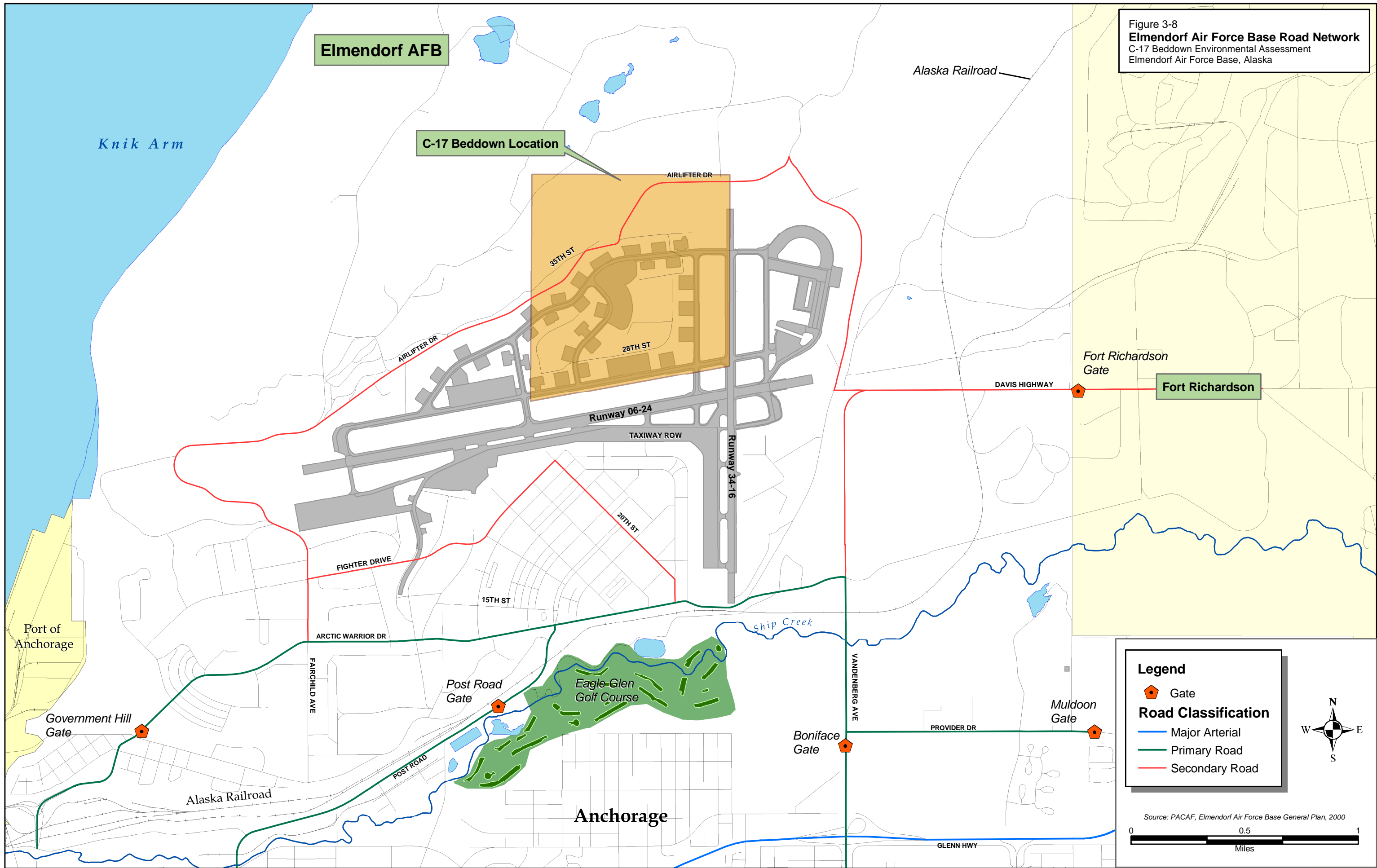
- Major arterial
- Primary road
- Secondary road
- Railroad

### 3.10.2 Existing Conditions

#### 3.10.2.1 Elmendorf Air Force Base

The existing transportation system is shown in Figure 3-8 (page 3-37). There are five vehicular access points into EAFB. There are four gates on the south and east sides of EAFB, and one access point through Fort Richardson. The primary access route to EAFB from the





community is via the Glenn Highway to Boniface Parkway, north of Provider Drive. The main gate off Glenn Highway is the Boniface Gate and Visitor's Center. Muldoon Gate serves the east and the Hospital vicinities. The Post Road Gate is to the west of Boniface Gate, and the Government Hill Gate serves as the westerly most point of access into a residential area. Any of these vehicular access points into EAFB may be temporarily closed at any time due to operational and/or security issues.

The primary internal roadways on EAFB are the south section of Davis Highway, Arctic Warrior Drive, Post Road, and Provider Drive. Additionally, Davis Highway and Post Road are both off-base primary roadways. Davis Highway serves the easterly side of EAFB, and acts as an access point into Fort Richardson. Provider Drive provides access to the Hospital and the southeast side of EAFB, as well as to the nearest major arterial, the Glenn Highway.

The secondary internal roadways are Airlifter Drive, Fighter Drive, and the north section of Davis Highway. Access to the area of the Proposed Action is provided by Airlifter Drive. Secondary roadways, 35th and 28th Streets, grant access to facilities situated north and east of the flightline. Access is provided to the main EAFB area, the Base Exchange, by use of 9th Street.

The intersection of Arctic Warrior Drive and Davis Highway has become congested and is a hindrance to the flow of traffic on EAFB. This congestion typically coincides with the daily working hours of base personnel (PACAF, 2004 in process).

A railroad right-of-way is located in the south and east portions of EAFB. The rail line travels in a northeasterly direction, entering EAFB north of Eagle Glen Golf Course, crossing Vandenberg Avenue and then the Davis Highway, and exiting at the Fort Richardson boundary. The tracks within the right-of-way belong to the Alaska Railroad Company, but all other tracks on EAFB are owned by EAFB.

### 3.10.2.2 Anchorage Bowl Area

Table 3-8 shows actual counts for the annual average daily traffic (AADT) on roadways at four locations near EAFB from 1999 to 2002. A 3 percent growth rate was used to project traffic counts from 2003 to 2007.

<b>TABLE 3-8</b> Annual Average Daily Traffic Counts near Elmendorf Air Force Base <i>C-17 Beddown Environmental Assessment</i> <i>Elmendorf Air Force Base, Alaska</i>									
	1999	2000	2001	2002	2003	2004	2005	2006	2007
Boniface Parkway—just South of Glenn Highway	19,021	19,339	20,060	19,442	20,026	20,626	21,245	21,883	22,539
Muldoon Road—just South of Glenn Highway	29,242	29,253	31,868	29,253	30,131	31,035	31,966	32,925	33,913
C Street—South of Government Hill Gate	16,550	13,125	15,096	12,205	12,572	12,949	13,337	13,737	14,149
A Street—South of Government Hill Gate	13,660	9,650	8,752	7,563	7,790	8,024	8,265	8,513	8,768
Source: Alaska Department of Transportation & Public Facilities, <i>Traffic Volume Report</i> , 2002									

## 3.11 Hazardous Materials and Waste

The proposed C-17 beddown area is located within the vicinity of numerous contaminated sites. General conditions of these sites were reviewed through consultation with 3 Civil Engineer Squadron/Environmental Flight, Planning Section (3 CES/CEVP). This included a cursory review of the environmental property condition maps and brief discussions with 3 CES/CEVP staff. The sites considered for this review were those that lie within or adjacent to the proposed C-17 beddown location. Groundwater contamination, approximately 30 feet bgs, is not expected to have an impact on site restoration costs. Therefore, this review focused only on those sites with soil contamination.

In general, the sites reviewed have fuel-related contamination. Table 3-9 summarizes the environmental conditions of real property for the C-17 beddown area on a site-by-site basis.

EAFB has land use controls in place for FT23, SD25, and SD24 as part of the cleanup remedy at Operable Unit 4 (OU 4; EAFB, 1995). Land use controls would remain in place as long as contamination remains at levels that prevent unrestricted and unlimited use of a site. This is to prevent people from being exposed to contaminated soil or groundwater.

At OU 4, controls on land and water use restrict access to the contaminated groundwater until cleanup levels have been achieved. Groundwater is monitored and evaluated semi-annually to assess contaminant migration and timely reduction of contaminant concentrations by intrinsic remediation. In addition, five-year reviews assess the protectiveness of the remedial action, as long as contamination remains above clean up levels.

Land use controls restrict access to the contaminated shallow soils throughout OU 4 until clean up levels have been achieved. Deep soils are being treated with bioventing or contaminants are being degraded through intrinsic remediation. When contaminant concentrations are below clean up levels, bioventing will be discontinued. Both shallow and deep soils are monitored and evaluated bi-annually to assess contaminant migration and timely reduction of the contaminant concentrations.

## 3.12 Socioeconomics

### 3.12.1 Definition of Resource

Pertinent characteristics of the social and economic environment in the area surrounding the C-17 beddown are considered socioeconomic factors under NEPA. The relevant characteristics addressed in this EA include impacts to:

- Economic activity
- Population and housing
- Public services
- Environmental justice and the protection of children

E.O. 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (White House, 1994a), requires federal agencies to identify and address disproportionately high and adverse impacts to minority and low-income

**TABLE 3-9**  
Environmental Condition Summary of the C-17 Beddown Location  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Site Number	Site Location	Environmental Condition
FT23 and nearby UST	The fire training area (FT23) is approximately 400 feet north northeast of Hangar 12. A previously-removed 22,000-gallon underground storage tank (UST) is located approximately 600 feet east northeast of Hangar 12, adjacent to the fire training area.	There are active bioventing systems treating deeper petroleum-contaminated soil at both the fire training area and UST locations. Therefore, remedial action is considered to be incomplete at this site.  Petroleum-contaminated shallow soil may be encountered during the construction of C-17 facilities. Solvent-contaminated soil may also be encountered.
SD24	SD24 consists of two locations. The first location lies approximately 200 feet north of Hangar 10, while the second location is approximately 300 feet southwest of Hangar 10.	Remedial actions were not required at either location due to low concentrations of petroleum contamination. No further action was recommended. However, residual soil contamination may be encountered if excavation is conducted in this area.
SD25	SD25 is situated approximately 100 feet east of Hangar 11.	Remedial actions at this site are underway, but required remedial actions have not yet been taken.
ST64	USTs at Building 16430 were located approximately 400 feet southwest of Hangar 11.	After the removal of the four USTs, monitored natural attenuation was recommended as the remedial action for the site. However, if the future intended use of the area changes, additional response actions may be required.
ST79	USTs at Building 14415 were located approximately 200 feet north of Hangar 8.	After the replacement of the three USTs, monitored natural attenuation was recommended as the remedial action for the site. However, if the future intended use of the area changes, additional response actions may be required.
ST515	The UST at Pump House 6 (ST515) was located approximately 150 feet northwest of Hangar 12.	One 5,000-gallon UST was removed from Pump House 6. No petroleum contamination was identified during the tank assessment. No further remedial actions are required.
ST512	The UST at Pump House 7 (ST512) was approximately 300 feet southwest of Hangar 14.	One 5,000-gallon UST was removed from Pump House 7. No petroleum contamination was identified during the tank assessment. No further remedial actions are required.
LF400	LF400 is located approximately 700 feet northeast of Hangar 12.	This site is reportedly closed and should not impact the C-17 beddown Proposed Action.

populations. The purpose of E.O. 12898 is to ensure the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people should bear a disproportionate share of the negative environmental effects of industrial, municipal, and commercial operations, or the execution of federal, state, local, and tribal programs and policies.

E.O. 13045, "Protection of Children from Environmental Health Risks and Safety Risks" (White House, 1997), requires an analysis of risks that may disproportionately affect children. This E.O. defines environmental health and safety risks as "risks to health or to safety that are attributable to products or substances that the child is likely to come in contact with or ingest." This E.O. requires federal agencies to ensure that their policies, programs, activities, and standards address these risks.

An analysis of the potential socioeconomic impacts of the C-17 beddown facility requires establishment of a "region of influence" (ROI). This is the geographical area within which the principal direct and secondary impacts of a Proposed Action would occur. The ROI for the proposed C-17 beddown is EAFB and the Municipality of Anchorage. A large number of personnel that reside off base live in the Chugiak/Eagle River area, which is included in the Municipality of Anchorage. Other personnel are concentrated close to the EAFB entrances in the Muldoon and Boniface areas of the Municipality of Anchorage.

Data were obtained from a variety of sources. These data sources include the USAF, the Alaska Department of Community and Economic Development (Alaska DCED, 2004), and the Municipality of Anchorage. Additional information was obtained through telephone interviews with EAFB community planners.

### 3.12.2 Economic Activity

#### 3.12.2.1 Elmendorf Air Force Base

The Anchorage economy relies on EAFB for sales of goods, as well as for employing military dependents. The 2003 annual payroll for active duty personnel was \$343.6 million and for civilian personnel working on base it was \$58.2 million. An additional \$17.8 million of employment income was from other sources. This provides a total of \$419.6 million in employment income that funnels through the local economy.

The U.S. Army has proposed to transform the current Legacy force to an Objective force during the next 30 years. As part of this action, the 172nd Infantry Brigade at Fort Wainwright, Alaska, and Fort Richardson, Alaska, were scheduled to be transformed into a Stryker Brigade Combat Team by May of 2005 (CEMML, 2004), but the date of deployment is no longer certain. The C-17s are designed to support deployment of the 172nd Stryker Brigade (*Alaska Military Weekly*, 2004). About \$117.5 million in new construction is planned at EAFB to support the C-17s (Semmler, personal communication [pers. comm.], 2004).

The most current employment information available from EAFB indicates a total of 6,701 active duty personnel employed at EAFB, along with 10,183 dependents, 1,152 civil service personnel, and 431 Non-Appropriated Fund (NAF) personnel. Therefore, a total of 18,467 persons work and live on the installation (ALCOM, 2004). This total employment figure includes Navy and Marine personnel working on EAFB.

#### 3.12.2.2 Anchorage Bowl Area

In 2003, the Anchorage workforce grew by 1,800 jobs, continuing 15 consecutive years of employment growth. It is expected that the economy for the Anchorage area will continue to grow steadily, with an estimated 1,900 new jobs for 2004, according to the Anchorage Economic Development Corporation (Alaska Department of Labor and Workforce

Development, 2004). These new jobs are expected to be in health care, tourism, business and professional services, non-profit organizations, and retail industries. In 2004, no new jobs are expected in the construction and oil industries, and a loss of 100 government jobs has been predicted.

### 3.12.2.3 State of Alaska

In 2003, the Alaska workforce grew by 4,500 jobs, continuing 16 consecutive years of employment growth. Most of this growth occurred within the following industries: seafood processing, construction, retail trade, banking and real estate, health care and social assistance, and hotels and restaurants. The oil industry experienced a decline resulting in a workforce nearly 15 percent lower than it was in 2001.

The mobilization of the 172nd Stryker Brigade would bring approximately 2,400 new uniformed military members to Alaska in the next two years. About \$1.2 billion in new construction of facilities to support the brigade is under way.

### 3.12.3 Population and Housing

Over 18,000 military personnel work on EAFB. Approximately 13,000 of these are residents who occupy on-base housing (EAFB, 2004). EAFB has recently undergone the construction of additional housing units and dormitories. As of 2003, a total of 828 dormitory units were available for unaccompanied (unmarried) personnel, along with 1,814 housing units available for accompanied (married) personnel (ALCOM, 2004).

### 3.12.4 Public Services

The 3rd Wing is the host unit at EAFB. It is responsible for maintaining the daily operation of the installation and furnishing services and support to EAFB's military personnel, civilian staff, family members, and the surrounding community.

Public services include services available on and off base. The 3rd Mission Support Group, Anchorage Police Department, EAFB Fire Department, Anchorage Fire Department, 3rd Medical Group, Anchorage medical services, Anchorage School District schools, and other public services are included in this evaluation.

#### 3.12.4.1 Police Services

**Off-Base.** The Anchorage Police Department is the largest police department in Alaska. It serves a population of approximately 227,000 in a service area encompassing 159 square miles.

**On-Base.** The 3rd Mission Support Group Commander has responsibility for controlling and safeguarding EAFB property. Routine patrols of the installation are accomplished on a 24-hour basis by security police.

#### 3.12.4.2 Fire Protection Services

**Off-Base.** Off-base assistance is available for the community through the Anchorage Fire Department, which currently staffs eleven fire stations. In addition, off-base departments may request assistance with automobile accidents, confined space, high/low angle rescue, hazardous materials, aircraft accidents, water rescue, emergency medical services (EMS),

rail accidents, petroleum, oil, or lubricant (POL) fires/spills, shipboard fire fighting, and any other incidents beyond their capability.

The Municipality of Anchorage fire service area covers the immediate 100 square miles of the Anchorage bowl. EMS coverage extends throughout the 1,980 square miles of the entire Municipality of Anchorage.

Mutual Aid agreements exist between the Anchorage Fire Department, State of Alaska International Airport Aircraft/Rescue/Fire Service, EAFB Fire Department, Fort Richardson Fire Department, Girdwood Volunteer Fire Department, and Chugiak Volunteer Fire Department. In addition, the Alaska State Division of Forestry and the U.S. Bureau of Land Management help protect residents and property lying within the 1,980-square-mile Municipality of Anchorage during the wildland fire season (EAFB, 2004).

**On-Base.** The EAFB Fire Department provides 24-hour emergency services to EAFB personnel and property in an area covering more than 13,000 acres and over 700 buildings. There were over 1,400 responses to emergencies in 2002. The Fire Chief is responsible for the overall administration of the EAFB Fire Department. The EAFB fire department has five fire stations (1, 2, 3, 6, and 7). The vehicles available include multiple Aircraft Rescue and Fire Fighting (ARFF) and structural vehicles.

Fire Station 1 is located nearest the Proposed Action. However, in the event of an emergency, all stations could respond to the C-17 beddown location (Cobalt, pers. comm., 2004).

#### **3.12.4.3 Medical Services**

**Off-Base.** Emergency medical services are available in the Anchorage area through the Anchorage Fire Department, local hospitals (for example, Anchorage Regional Hospital), and various medical care providers in the Anchorage area.

**On-Base.** Hospital and medical clinic services are provided by the 3rd Medical Group in a joint venture with the VA. The DoD/VA Joint Venture Medical Treatment Center is located on the southeastern portion of the installation, adjacent to the Fort Richardson boundary.

#### **3.12.4.4 Schools**

**Off-Base.** This evaluation considered the Anchorage School District schools utilized by EAFB based on current enrollment status and the School District's ability to absorb additional students brought to EAFB as a result of the Proposed Action.

There are three Anchorage district schools serving EAFB. Children in grades kindergarten through sixth attend Aurora Elementary School, Mt. Spurr Elementary School, or Orion Elementary School. Special education pre-school students receive services through Mount Iliamna School.

All junior high students in grades 7-8 residing on EAFB attend Central Middle School. Senior high students in grades 9-12 attend Bartlett High School, located on Muldoon Road. Central Middle School and Bartlett High School are both located off base.

**On-Base.** EAFB provides pre-school and school age programs, a teen center, child care centers, and a youth center for military personnel residing and working on the installation.

In addition to child care centers on EAFB, there are many work-at-home parents who provide child care in their homes. EAFB has a training and certification program available for these home providers (Thomasson, pers. comm., 2002).

#### 3.12.4.5 Other Public Services

**Off-Base.** Other public services available are those consistent with a metropolitan area of 227,000 people.

**On-Base.** Other public services include a people center, community center, fitness center, library, heritage park, skate park, bowling alley, soccer field, baseball fields, golf courses, stables, and churches. All of these facilities are located south of the east-west runway, with the nearest facility located approximately one-quarter to one-half mile from the proposed C-17 beddown location. A ski area and ski chalet are located north and west of the east-west runway.

### 3.12.5 Environmental Justice and the Protection of Children

“Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations” (E.O. 12898, White House, 1994a) requires analysis of the potential for federal actions to cause disproportionate health and environmental impacts on minority and low-income populations. The municipality of Anchorage comprises the region of influence for environmental justice issues. In 2000, this region contained 260,283 persons (U.S. Bureau of the Census, 2004). Of these, 30.1 percent were members of minority groups (not white). In 1999, 7.3 percent were low income (below the poverty level). Baseline noise levels of 65 DNL or greater do not affect any communities or off-base populations (USAF, 2001).

Although no standards exist for siting facilities in areas where children will be concentrated, EAFB community planners consider noise contours and explosive clear zones when planning or siting new facilities on base for children.

## 3.13 Cultural Resources

### 3.13.1 Definition of Resource

Cultural resources are defined as any historic, archaeological, or Native American properties of interest or artifacts (USAF, 1994c). Any prehistoric or historic district, site, building, structure, or object considered important to a culture, subculture, or community for scientific, traditional, religious, or other purposes is regarded as a cultural resource. Cultural resources include archaeological resources (both prehistoric and historic), historic architectural resources, and traditional resources.

### 3.13.2 Existing Conditions

EAFB's *Integrated Cultural Resources Management Plan* (ICRMP; EAFB, 2003c) is a five-year plan for fiscal years 2002 through 2006. It is for the use of any personnel involved in planning on EAFB. The ICRMP summarizes the history and prehistory of the base, reviews past historical and archaeological survey efforts, outlines and assigns responsibilities for the management of cultural resources, and discusses related concerns and standard operating



procedures for EAFB. It describes procedures that will help to preserve the cultural resources of EAFB within the context of the base mission.

There are 56 buildings or structures extant on the base that are considered eligible for the NRHP. Most of these are buildings constructed during World War II. As of 2002, there are 27 known archaeological sites on EAFB. EAFB does not consider any of these sites to be eligible for the NRHP; however, four of the sites merit further investigation to determine whether they may be eligible for the NRHP. There are large areas of the base that have not been inventoried for archaeological sites. EAFB has initiated contact with local Alaska Native Villages through an ethnohistoric study. This study found that there may be burial sites located on EAFB.

The Cultural Resources Manager (CRM) is the individual responsible for the management of cultural resources on a day-to-day basis on the base. This individual is assigned to 3 CES/CEV and is responsible for following internal review procedures and procedures for consultation with the Alaska State Historic Preservation Office (SHPO), the Advisory Council on Historic Preservation, and the National Park Service.

Within the vicinity of the C-17 beddown location, there are three ammo storage bunkers (igloos) that are considered eligible for the NRHP. These are Buildings 15515, 15532, and 14545.

## 3.14 Visual Resources/Aesthetics

### 3.14.1 Definition of Resource

Visual resources are the natural features (landforms, water bodies, and vegetation) and man-made features (buildings, fences, and signs) that make up the landscape. A visual impression of an area is derived from the types of features, their arrangement, and the contrast among them. Although each viewer's perception may be slightly different, an overall landscape character can be assigned to an area, and impacts to that character can be assessed. As part of the C-17 beddown assessment on visual resources, the visual districts established for EAFB were considered, along with the Architectural Compatibility Study (EAFB, 2001b).

### 3.14.2 Existing Conditions

Viewer groups for the Proposed Action would include those who have views from the north ramp and airfield, such as pilots, maintenance crews, and other EAFB personnel associated with the flightline. Groups with a view to the north ramp and airfield include residents and other EAFB personnel not associated with flightline operations. For the most part, areas off base do not have a view of the EAFB airfield where the Proposed Action would occur.

The visual character of EAFB can be described as generally flat with concentrated industrial and commercial development around the airfield, followed by mixed development of residential, commercial, and open space. To the southwest, EAFB abuts Government Hill residential area. In terms of landforms and vegetation cover, EAFB does not change significantly until the north and northwest sides of EAFB are reached. Here there are heavily forested areas with very little development. There is also a forested buffered area between Fort Richardson and EAFB. The mountains are visible from all directions on EAFB.

In accordance with the standards set forth in the Architectural Compatibility Study (EAFB, 2001b), new development occurring on EAFB should be consistent with an “Alaskan” theme and should incorporate general architectural elements which establish the physical appearance and visual character of buildings installation-wide. The relationship of an individual building to its function and its surroundings creates its context. The primary consideration for the visual environment is whether a building has a “foreground” context or a “background” context. Destination buildings refer to those buildings whose function or location makes them visually prominent, such as the Chapel or 3rd Wing Headquarters. Background buildings are those buildings that do not require a prominent visual image or location, such as warehouses or industrial buildings.

The north ramp of the airfield is a well-developed, mostly paved area that contains fuel cell and maintenance hangars, parking aprons, hard stands, and taxiways. The character of this area is best described as industrial development with views of USAF planes. New buildings constructed in this area would be considered “background buildings.” This area would not be considered scenic.

EAFB has established nine visual districts, one of which is the Air Operations District. The visual districts have architectural design guidelines to promote visual design themes and a sense of community at the installation.

The area around the airfield is generally flat with mostly industrial development in the immediate vicinity of the Proposed Action, and very little, or no, vegetation. In the cantonment area, just beyond the industrial development, are mixed uses of residential, commercial, and open space areas.

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## SECTION 4

# Environmental Consequences

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The following sections discuss the potential environmental consequences of the Proposed Action and the No Action Alternative.

Potential environmental consequences include those related to:

- Geological Resources
- Land Use
- Coastal Zone Management
- Biological Resources
- Water Resources
- Air Quality
- Airspace Management
- Noise
- Safety
- Transportation and Circulation
- Hazardous Materials and Waste
- Socioeconomics
- Cultural Resources
- Visual Resources/ Aesthetics

## 4.1 Geological Resources

### 4.1.1 Impacts Criteria

The geological effects a project has on a site depend on the following factors:

- Exposure of people to risk of injury or death involving the rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, or a landslide that cannot be mitigated by standard engineering design
- Exposure of structures to damage or loss due to seismic events, liquefaction, strong seismic ground shaking, landslides, thaw settlement, frost heaving, bearing capacity failure, or excessive settlement that cannot be mitigated by standard engineering design
- Substantial increases in wind or water erosion of soils due to project construction or operational activities
- Siltation of surface waters flowing through the project area
- Damage to existing utilities, pavements, or structures due to construction or operational activities
- Instigation of landslides or other slope movement by construction activities

- Dewatering of wetlands, flooding of previously dry areas, or diversion of established surface water flow due to settlement, excavation, or well-point installation for construction or operational activities

## 4.1.2 Impacts

### 4.1.2.1 Proposed Action

It is proposed that the project be located in an area of flat terrain at the site of an existing hangar. It is anticipated that there would be minimal excavation for footings and minimal site grading. No surface water exists within the extent of the Proposed Action. Therefore, no adverse impacts would be expected, directly or indirectly, to geological resources as a result of the Proposed Action.

### 4.1.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action Alternative would not alter geological resources.

## 4.2 Land Use

### 4.2.1 Impacts Criteria

The effects of the Proposed Action and the No Action Alternative on land uses were evaluated relative to:

- The degree to which construction and/or operation of facilities would interfere with the activities or functions of adjacent existing and proposed land uses
- Compatibility with EAFB's 50-year plan (USAF 3 CES/CECD, 2003).

## 4.2.2 Impacts

### 4.2.2.1 Proposed Action

From a functional relationship perspective, the site proposed for the C-17 beddown would be well suited to support the new mission. The area proposed currently supports airlift and other large frame aircraft operations and maintenance activities. The addition of the maintenance and operations activities associated with the C-17 mission would not adversely impact current activities in the area and would adhere to the land use recommendations presented in the installation's General Plan (PACAF, 2004 in process) and its 50-year plan (USAF 3 CES/CECD, 2003).

### 4.2.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. Future land-use designations would not change based on the No Action Alternative, and future development would continue to be measured against the installation's General Plan (PACAF, 2004 in process) and its 50-year plan (USAF 3 CES/CECD, 2003).

## 4.3 Coastal Zone Management

### 4.3.1 Impacts Criteria

An impact to a coastal zone would be considered significant if it resulted in deterioration of a coastal ecosystem by negatively affecting:

- Coastal scenic and open space resources
- The valuable coastal economy (harbors and ports, energy facilities, visitor facilities)
- Coastal ecosystem (resulting in stream flooding and erosion, subsidence, and pollution)
- Beaches (public use and beach recreation)
- Ocean and other marine resources

### 4.3.2 Impacts

#### 4.3.2.1 Proposed Action

The C-17 beddown location is not within the 150 acres of shoreline that are within the coastal zone boundary managed by EAFB, no impacts to coastal areas would be expected as a result of the Proposed Action.

#### 4.3.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. No impacts to coastal areas would be expected.

## 4.4 Biological Resources

### 4.4.1 Impacts Criteria

The effects of the Proposed Action and the No Action Alternative on biological resources were evaluated relative to the degree to which construction and/or operation of facilities would interfere with the habitat or wildlife behavior at the Proposed Action site as well as habitats within the area of potential effect from noise, air quality, or other pertinent project aspects.

#### 4.4.1.1 Vegetation

Construction activities that require clearing or defoliation would negatively impact vegetation at the construction site. The evaluation of vegetation and floral communities near the proposed project site was based on a literature review of EAFB's mapped resources. Floral communities on EAFB were also examined by reviewing and analyzing existing site-specific literature and data. These literature and data were used to identify any documented floral communities or site characteristics that would indicate floral communities within the Proposed Action area. The following documents were used to gather preliminary information about the vegetation, soils, and hydrology of the Proposed Action area:

- *Integrated Natural Resources Management Plan for Elmendorf Air Force Base 2000-2005* (USAF 3rd Wing, 2000)
- *Elmendorf Air Force Base General Plan* (PACAF, 2004 in process)

#### 4.4.1.2 Wetlands

Wetlands potentially affected by the Proposed Action were evaluated with respect to pertinent state and federal regulations, including Section 404 of the Clean Water Act (33 U.S.C. 1251 et seq.), Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), DoD Instruction 4715.3 (*Environmental Conservation Program*; DoD, 1996b), the “Integrated Natural Resources Management” regulation (AFI 32-7064; USAF, 1994b), U.S. Army Corps of Engineers regulations (33 CFR Parts 320 et seq.), and Alaska Water Quality Standards (18 Alaska Administrative Code [AAC] 70). Additionally, the State of Alaska Department of Natural Resources, Division of Land requires a land-use permit when any activity occurs near or on state lands or stream beds under Alaska Statute (AS) 38.05.850 (USAF 3rd Wing, 2000). The COE has been given the responsibility and authority to regulate the discharge of dredged or fill materials into waters of the United States, including wetlands. (See Section 3.4.3.2)

The following information, published in the *Integrated Natural Resources Management Plan for Elmendorf Air Force Base 2000-2005* (USAF 3rd Wing, 2000), describes regulatory requirements instituted for the management of wetland and riparian habitats on federal facilities. Under the “Integrated Natural Resources Management” regulation (AFI 32-7064; USAF, 1994b), the USAF is instructed to comply with all federal and state regulatory requirements, as well as to inventory and monitor wetlands. Federal regulations include E.O. 11990 (regarding the Protection of Wetlands; White House, 1977a), which stipulates that:

...Each agency shall provide leadership and shall take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency’s responsibilities....

Additionally, DoD Instruction 4715.3 (*Environmental Conservation Program*; DoD, 1996b) states that:

DoD operations and activities shall avoid the net loss of size, function, or value of wetlands. Additionally, the DoD will preserve the natural and beneficial values of wetlands in carrying out its activities. The development of mitigation ‘banks’ is encouraged as sound conservation planning.

Criteria described in these regulations and guidelines were used to evaluate the potential impacts of the Proposed Action.

#### 4.4.1.3 Wildlife

The analysis of wildlife potentially affected by the Proposed Action and the No Action Alternative is based on a review of existing information to identify wildlife or wildlife

habitat within the Proposed Action area. The following documents were used to gather preliminary information about the wildlife and wildlife habitat of the Proposed Action area:

- *Integrated Natural Resources Management Plan for Elmendorf Air Force Base 2000-2005* (USAF 3rd Wing, 2000)
- F-22 EIS and Appendices (USAF, 2001)
- *Elmendorf Air Force Base General Plan* (PACAF, 2004 in process)
- *Description of Proposed Action and Alternatives, C-17 Beddown Environmental Impact Analysis, Elmendorf AFB, Alaska* (CH2M HILL, 2004)

#### 4.4.1.4 Threatened and Endangered Species

The analysis of threatened and endangered species potentially affected by the Proposed Action and the No Action Alternative is based on a review of existing information. The following documents were used to gather information about the presence or absence of protected species in the Proposed Action area:

- USFWS listed species as available on their web site (<http://endangered.fws.gov/wildlife.html#Species>)
- National Marine Fisheries Service listed species available on their web site ([http://www.nmfs.noaa.gov/prot\\_res/species/ESA\\_species.html](http://www.nmfs.noaa.gov/prot_res/species/ESA_species.html))
- *Integrated Natural Resources Management Plan for Elmendorf Air Force Base 2000-2005* (USAF 3rd Wing, 2000)
- *Elmendorf Air Force Base General Plan* (PACAF, 2004 in process)
- *Description of Proposed Action and Alternatives, C-17 Beddown Environmental Impact Analysis, Elmendorf AFB, Alaska* (CH2M HILL, 2004)

### 4.4.2 Impacts

#### 4.4.2.1 Proposed Action

**Vegetation.** Since the Proposed Action is located in an area that is already largely developed and paved, no additional adverse impact to floral communities would be expected, directly or indirectly, as a result of the Proposed Action.

**Wetlands.** There are no wetlands on or near the site of the Proposed Action. In addition, surface water runoff patterns would not change. Therefore, no adverse impact would be expected, directly or indirectly, to downgradient wetlands as a result of the Proposed Action.

**Wildlife.** No adverse impact would be expected, directly or indirectly, to wildlife habitat as a result of the Proposed Action. Construction and operations might generate additional or differing noise conditions at the Proposed Action site. Temporary changes in urban wildlife behavior might result. No long-term changes from existing conditions would be expected. Noise contours calculated for the operation of the C-17s at EAFB indicate that the Cook Inlet beluga whales would not be exposed to noise levels different from current levels.



**Threatened and Endangered Species.** There are no known threatened or endangered species at EAFB. Therefore, no adverse impacts would be expected, directly or indirectly, to threatened and endangered species as a result of the Proposed Action. In addition, it is not expected that bald eagles or marine mammals (other protected species) would be adversely impacted.

#### 4.4.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action alternative would not alter biological resources.

## 4.5 Water Resources

Water resources can be adversely impacted by land alteration and new construction. Potential impacts include erosion, changes in surface flow, and reduced infiltration and groundwater recharge due to an increase in impervious surfaces. Runoff from newly developed areas could also contain contaminants that could conceivably degrade receiving waters.

### 4.5.1 Impacts Criteria

Objective criteria were used to analyze and describe potential direct and indirect impacts of the proposed construction of C-17 facilities. Main considerations include the footprint of the proposed construction site and the area of natural land that would be covered by an impervious surface by constructing these facilities.

Runoff from the proposed site could contain contaminants that could contribute to the pollution of receiving waters. Newly landscaped areas could increase the loading of fertilizers and pesticides in the water. Increased parking areas, roads, and aircraft hangars could increase sediments, oils, and deicing salt in storm water. Usually, storm water runoff from urbanized areas is also higher in chemical oxygen demand (COD), biological oxygen demand (BOD), suspended sediments, and nutrients (Perry et al., 1996).

Developing a natural landscape can fundamentally alter its hydrology with respect to the proportion of water that infiltrates and the proportion of water that runs off of the surface. In natural landscapes, precipitation slowly infiltrates through grasses and soil to the groundwater. Water is naturally filtered by the soil and other geology as it slowly percolates down to the aquifer. Water flows off of impervious surfaces rapidly rather than slowly infiltrating. For example, in natural and undeveloped areas, 50 percent of the precipitation infiltrates, 40 percent evapotranspires, and only 10 percent runs off the surface. In highly urbanized areas, 15 percent of the precipitation infiltrates, 30 percent evapotranspires, and 55 percent runs off into receiving waters carrying oils, sediments, and other pollutants from the surface (Chow et al., 1988).

Tree removal in the proposed site could also disrupt and alter a landscape's soil, hydrology, and water chemistry because the tree roots are no longer available to retain and anchor soil. Consequently, deforested sites are often susceptible to increased erosion, surface flow, and nutrient leaching from the soil (Perry et al., 1996). Increased surface runoff flow and volume

can ultimately modify the geomorphologic characteristics of receiving waters by increasing erosion, sediment deposition, and transport, and by channel instability.

## 4.5.2 Impacts

### 4.5.2.1 Proposed Action

Typically, storm water runoff from the construction sites could contain contaminants that could pollute receiving waters. Exposed soil surfaces could induce erosion and sedimentation. Any potential impacts from construction activities would be mitigated by ensuring that site-specific BMPs were employed to prevent erosion and prevent any construction debris or pollutants from entering storm water.

EAFB's SWPPP has identified erosion control practices and other BMPs that are applicable for the Proposed Action (USAF 3rd Wing, 2000). The aim of these practices is to prevent construction activities from contaminating storm water by:

- Minimizing soil disturbance when possible
- Using mulch or artificial cover where repeated disturbance is expected
- Stabilizing soil within 30 days of final disturbance using vegetation, paving, or rip-rap
- Adhering to appropriate state and federal procedures for significant excavation
- Covering outside storage of materials or wastes
- Keeping exterior yards, parking areas, roads, and storage areas orderly and free of materials that could contaminate storm water
- Adhering to state and federal guidelines for erosion and sedimentation
- Sweeping paved areas
- Keeping drainage and outfall pipes unclogged

The proposed construction site for the C-17 beddown is located north of Runway 06-24, which is an area that currently houses the C-5 transient ramp, the 517th ALS, and the 962nd Airborne Control Squadron. In general, this area is already considerably developed and used for aircraft activities and support. Therefore, there should not be a substantial change in impervious surfaces or a reduction of natural areas for percolation and groundwater recharge. Furthermore, there are no streams, creeks, ponds, or lakes in the immediate construction area. Therefore, these surface water resources would not be directly impacted by construction activities related to the C-17 beddown.

The proposed C-17 facility site is located within the Cherry Hill Ditch drainage, which discharges into the Cook Inlet. Consequently, any initial construction impacts and longer term cumulative impacts would affect only the Cook Inlet. No adverse impact would be expected, directly or indirectly, to freshwater resources as a result of the Proposed Action.

#### 4.5.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action alternative would not alter water resources.

## 4.6 Air Quality

### 4.6.1 Impacts Criteria

An impact to air quality would be considered significant if it resulted in one or more of the following occurrences:

- An increase in ambient air pollution above the NAAQS
- Contribution to an existing violation of the NAAQS
- Interference with or delaying timely attainment of the NAAQS
- Impairing visibility within any federally mandated Prevention of Significant Deterioration (PSD) Class I area.

EAFB is currently in attainment for all NAAQS. EAFB is, however, adjacent to the Municipality of Anchorage. The Municipality of Anchorage is currently an attainment maintenance area for carbon monoxide. Therefore, indirect CO emission increases were evaluated to determine if a general conformity determination would be required.

### 4.6.2 Impacts

#### 4.6.2.1 Proposed Action

The Proposed Action would result in an increase of criteria pollutants from additional stationary and mobile sources.

**Stationary Emissions.** Stationary emissions would increase because additional space is being constructed to support the C-17s. This additional space would require additional space heating and emergency generation capacity, which results in an increase in potential emissions from natural gas and diesel combustion. It is assumed that 1,500 kilowatts (kW) of emergency diesel-powered generation capacity operating 500 hours a year would be added due to the C-17 beddown at EAFB.

Stationary VOC emissions would also increase due to an increase in aircraft skin area that requires touch-up painting. Though there would be a net loss in aircraft numbers due to the departure of 14 C-130 aircraft,\* the C-17 has approximately three times more skin area than the C-130. It is expected that this would result in an approximate increase of 50,000 square feet (ft<sup>2</sup>) of skin area that would require occasional touch-up painting at EAFB. This equates to a 170 percent increase in the expected surface area to be painted. A summary of the expected potential stationary source emissions increases is shown in Table 4-1.

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\* To continue to supply remote DoD sites in Alaska and Canada, it is expected that four smaller cargo aircraft with characteristics similar to C-130 aircraft will continue to operate from Kulis ANGB or on a contract basis. For the purpose of analysis, it is conservatively assumed that four C-130 aircraft represent the supply aircraft.

EAFB's potential flightline stationary source emissions would not increase significantly above the potential emissions estimated in 2003. The expected emissions increases of various pollutants are shown in Table 4-2. The emissions increases would only affect the EAFB flightline. No other stationary emissions sources at EAFB would be affected by the C-17 beddown.

**TABLE 4-1**  
Potential Stationary Source Emissions Increases due to C-17 Beddown  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Source	CO	VOC	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>
Emergency Power	2.7	0.4	6.5	0.5	0.2
Space Heating	6.7	0.4	4	0.05	0.6
C-17 Touch-up Painting	N/A	3.1	N/A	N/A	0.7
<b>Total</b>	9.4	3.9	10.5	0.55	1.5

Source: AFCEE, 2002  
Note: All results in tons per year  
N/A = not applicable

**TABLE 4-2**  
Estimated Potential Criteria Pollutant Emissions Increases Due to C-17 Beddown  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

	CO	VOCs	NO <sub>x</sub>	SO <sub>2</sub>	PM <sub>10</sub>
Increase	8%	5%	5%	0%	8%

Source: AFCEE, 2002

EAFB would not violate any of the ambient air quality standards by these increases. In addition, the visibility of a Class I area would not be impacted. EAFB may need to modify the Flightline Title V permit to include the additional 1,500 kW of emergency generation capacity.

**Mobile Emissions.** The FAA has developed a tool to estimate emissions related to mobile sources on airports. This Emissions and Dispersion Modeling System (EDMS) is also used to determine emissions from aircraft and other related mobile sources on USAF bases.

The EDMS runs had two purposes:

- To determine the total mobile emissions increases resulting from the Proposed Action
- To determine if the project would result in large enough emissions increases in the Municipality of Anchorage CO attainment maintenance area to require a general conformity determination

A general conformity determination would be required if the Proposed Action had the potential to increase CO emission in the Municipality of Anchorage CO attainment maintenance area by 100 tons or more.

The only emission source with the potential to directly increase CO emissions that EAFB has control over is commuter traffic to and from EAFB and the Municipality of Anchorage attainment maintenance area. EAFB can provide programs such as ride-sharing and encourage commuters to use public transportation. Commuter traffic to and from EAFB was analyzed for its impacts upon the CO non-attainment area. Three EDMS runs were conducted:

- The baseline year (Table 4-3).
- The construction year (Table 4-4). This scenario assumes that construction for C-17 facilities has not been completed by the time the C-17s are bedded down at EAFB.
- The project year (Table 4-5). This scenario estimates project emissions once the C-17 beddown has been completed.

Emissions of CO from roadways are actually lower in both the construction year and the project years. This is because the model accounts for the automobile fleet becoming newer over time and assumes that per vehicle emissions would begin to decline.

NO<sub>x</sub> and sulfur oxide (SO<sub>x</sub>) emissions increase substantially over the baseline year (approximately 855 percent for NO<sub>x</sub> and 302 percent for SO<sub>x</sub>). This is because the C-17 is a turbofan aircraft and the C-130 is a turboprop aircraft, and the emissions profiles for the two aircraft engines are radically different. However, when these emissions are compared to total mobile emissions from EAFB for 2002 (Table 4-6), the increases in NO<sub>x</sub> emissions are approximately either 23 or 30 percent, depending on ceiling (inversion) layer heights and the increases in SO<sub>x</sub> emissions are approximately either 8 or 9 percent, depending on ceiling (inversion) layer heights.

**TABLE 4-3**  
Results from EDMS for the Baseline Year (2003)  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Source	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Aircraft	28.059	17.560	7.604	0.746	N/A
GSE/AGE/APU	1.106	0.306	3.812	0.413	0.247
Roadways	62.173	5.039	8.430	0.278	0.251
Parking Lots	2.618	0.218	0.092	0.003	0.003
<b>Total</b>	<b>93.956</b>	<b>23.123</b>	<b>19.938</b>	<b>1.440</b>	<b>0.501</b>

Source: AFCEE, 2002

Note: All results in tons per year. The FAA's Emissions and Dispersion Modeling System, Version 4.12 was used to estimate emissions from aircraft operations and associated equipment that are expected to result from the C-17 beddown at EAFB.

AGE = Aerospace Ground support Equipment

APU = Auxiliary Power Units

GSE = Ground Support Equipment

N/A = not applicable

**TABLE 4-4**

Results from EDMS for the Construction Year (2005-2007)

*C-17 Beddown Environmental Assessment**Elmendorf Air Force Base, Alaska*

Source	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Aircraft	51.439	11.977	179.264	4.632	N/A
GSE/AGE/APU	2.679	0.591	6.342	0.855	0.455
Roadways	60.324	5.080	8.458	0.295	0.250
Parking Lots	2.854	0.240	0.102	0.003	0.003
<b>Total</b>	<b>117.296</b>	<b>17.888</b>	<b>194.166</b>	<b>5.785</b>	<b>0.708</b>

Source: AFCEE, 2002

Note: All results in tons per year. The FAA's Emissions and Dispersion Modeling System, Version 4.12 was used to estimate emissions from aircraft operations and associated equipment that are expected to result from the C-17 beddown at EAFB.

N/A = not applicable

**TABLE 4-5**

Results from EDMS for the Project Year (2020)

*C-17 Beddown Environmental Assessment**Elmendorf Air Force Base, Alaska*

Source	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Aircraft	51.439	11.977	179.264	4.632	N/A
GSE/AGE/APU	1.817	0.278	3.323	0.857	0.386
Roadways	53.890	4.688	7.865	0.297	0.227
Parking Lots	2.681	0.224	0.096	0.003	0.003
<b>Total</b>	<b>109.827</b>	<b>17.167</b>	<b>190.548</b>	<b>5.789</b>	<b>0.616</b>

Source: AFCEE, 2002

Note: All results in tons per year. The FAA's Emissions and Dispersion Modeling System, Version 4.12 was used to estimate emissions from aircraft operations and associated equipment that are expected to result from the C-17 beddown at EAFB.

N/A = not applicable

**TABLE 4-6**

Percent Increase in Criteria Pollutant Emissions from C-17 Beddown Compared to Draft 2002 Mobile Emissions Inventory  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

Source	CO	VOC	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>
Total Emissions 952' Scenario	13	10	30	9	0.2
Total Emissions 1,908' Scenario	11	10	23	8	0.2

Source: U.S. Air Force, Institute for Operational Health, Air Quality Branch, Environmental Analysis Division, *2002 Mobile Source Air Emissions Inventory for Elmendorf AFB-Draft Report*, December 2003.

Note: All results in tons per year

The FAA's Emissions and Dispersion Modeling System, Version 4.12 was used to estimate emissions from aircraft operations and associated equipment that are expected to result from the C-17 beddown at EAFB.

The 952' and 1,908' levels refer to the atmospheric mixing zones for Elmendorf AFB. The atmospheric mixing zone height is the ceiling height of the layer of the earth's atmosphere where chemical reactions of pollutants can ultimately affect ground level pollutant concentrations. The atmospheric mixing zone height is also known as the height of the inversion layer. According to the EAFB weather service, during 2002 the lowest average mixing zone height was 952 feet, which occurred from October through December. The highest average mixing zone height was 1,908 feet, which occurred from April through June.

NO<sub>x</sub> is a precursor compound for both ozone and PM<sub>10</sub>. SO<sub>x</sub> is a precursor for PM<sub>10</sub>. The Municipality of Anchorage and EAFB are in attainment for ozone, PM<sub>10</sub>, and SO<sub>2</sub>. Therefore, increases in SO<sub>x</sub> and NO<sub>x</sub> due to the C-17 beddown would not impact the attainment status for these compounds at EAFB or in the Municipality or Anchorage. Additionally, since EAFB is over 100 kilometers from any Class I areas, the increased emissions of SO<sub>x</sub> and NO<sub>x</sub> would not impact the visibility index in a Class I area.

#### 4.6.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action Alternative would not alter air quality.

## 4.7 Airspace Management

### 4.7.1 Impacts Criteria

The FAA provides management oversight of all ongoing and planned changes to the structure of the national and local airspace through its Air Traffic Airspace Management (ATA). The ATA has nine geographically-based regional offices, including one in Anchorage. The Anchorage office provides guidance for the management and control of the airspace within the Alaska region, including the Anchorage Terminal Area airspace. The ATA's major goals are to maintain system safety, decrease system delays, increase system flexibility, increase system predictability, and increase user access (FAA, 2002b). Changes to the Anchorage Terminal Area airspace structure, including minor ones, are likely to require an airspace analysis. Guidelines for initiating or participating in the process of making changes to the airspace structure are provided in the FAA's *Airspace Management Handbook*

(*Checklist and Metrics*; FAA, 1999b). These guidelines include the criteria for evaluating impacts on airspace management based upon the desired outcomes/performance goals of the FAA ATA. The impact of the C-17 beddown project on airspace management would be considered as significant if it resulted in any of the following conditions:

- **System Safety.** Cannot maintain standards used to separate multiple aircraft, aircraft and physical structures, and aircraft and airspace surfaces due to changes in airspace structure and/or base facilities.
- **Flight Delays.** Aircraft operations within the Anchorage Terminal Area airspace are delayed due to airspace management changes. This does not include delays that are strictly due to weather conditions.
- **System Flexibility.** Airspace structure changes and procedures reduce the ability of airspace users to adapt their operations in response to changing air traffic conditions that require more efficient use of the Anchorage Terminal Area airspace.
- **System Predictability.** Anchorage Terminal Area airspace users experience inconsistent and unpredictable air traffic flows.
- **User Access.** Anchorage Terminal Area airspace changes increase airspace restrictions or reduce user access to the Anchorage Terminal Area airspace and Anchorage area airports.
- **Cultural and Natural Resource Impacts.** Anchorage Terminal Area airspace changes adversely impact cultural or natural resources due to overflights or other activities as discussed in other sections of this EA.

## 4.7.2 Impacts

### 4.7.2.1 Proposed Action

The proposed C-17 beddown would be for 8 new C-17 aircraft, which would replace 18 existing C-130 aircraft. This means that there would be fewer airlift force cargo aircraft utilizing the EAFB airspace. Although the C-17 is not an exact match to the C-130, the airspace operational procedures required for the Anchorage Terminal Area airspace are essentially the same. Therefore, the existing airspace structure would be sufficient and no changes to the EAFB or Anchorage Terminal Area airspace structure or management would be required.

### 4.7.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and no C-130 aircraft would be replaced at EAFB. Therefore, no changes to the existing airspace structure or its management would be required. The existing airspace structure is adequate for containing and routing existing and projected future increases in civilian and military aircraft operations within the vicinity of EAFB and the Anchorage Terminal Area airspace. The No Action Alternative would not alter airspace management.



## 4.8 Noise

### 4.8.1 Impacts Criteria

The main applicable criterion used to determine the level of significance of noise exposure due to the Proposed Action at noise-sensitive areas potentially affected is that applied by the USAF. However, a number of other guidelines and noise effects have been discussed here to address areas of potential concern to the public.

DNL is the community noise metric recommended by the EPA and has been adopted by most federal agencies (Federal Interagency Committee on Noise [FICON], 1992). It has been well established that DNL correlates well with community response to noise (Schultz, 1978; Finegold, 1994).

#### 4.8.1.1 U.S. Air Force

The USAF has established land-use noise-compatibility criteria consistent with those published by the Federal Interagency Committee on Urban Noise (FICUN) in its publication, *Guidelines for Considering Noise in Land Use Planning and Control* (FICUN, 1980). The USAF noise level criterion is a DNL of 65 dB. This is the threshold of incompatibility for residential and other noise-sensitive land uses, such as schools, hospitals, and religious facilities, to be developed in the vicinity of USAF bases.

#### 4.8.1.2 Other Federal Agencies

Other federal agencies, including the FAA, the U.S. Department of Housing and Urban Development (HUD), and the VA, also apply the same criterion level of DNL 65 dB to residential and other noise-sensitive areas.

Pursuant to the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.), the EPA established guidelines for noise levels “required to protect public health and welfare with an adequate margin of safety” (EPA, 1974). In its Levels Document, EPA determined that a yearly average day-night sound level of 45 dB would permit adequate speech communication in the home. The EPA recommends a noise level of DNL 55 dB or below to avoid activity interference and annoyance in outdoor areas of residential locations. These levels also apply to hospitals and educational facilities. However, the EPA guidelines do not constitute a standard, specification, or regulation.

### 4.8.2 Impacts

For further information on the methodology used to evaluate the noise impacts for both the Proposed Action and the No Action Alternative, please refer to Appendix B.

#### 4.8.2.1 Proposed Action

Under the Proposed Action, C-17 aircraft operations would occur in the vicinity of EAFB. C-17 aircraft would conduct roughly 4,000 annual operations at EAFB. Most of the operations would be mission- and training-related exercises (e.g., touch and go operations at EAFB and radar site resupply missions). It is expected that the C-17 aircraft would be conducting missions abroad with approximately 80 percent of the allocated flight hours.

Since it is assumed that the C-17 aircraft would not operate on weekends and holidays, the number of active flight days for the aircraft has been assumed to be 250 days per year. Based on 4,000 total annual flight operations and 250 days of activity, 16 C-17 operations would occur at the airfield on an average busy day. Of these, 90 percent (or 14.4 daily operations) would be takeoffs and landings and the remaining 10 percent would be touch-and-go operations. For a conservative assessment of noise impacts, 90 percent of C-17 operations has been allocated to daytime (0700 to 2200) hours and 10 percent to nighttime (2200 to 0700) hours. This day/night breakdown is more conservative than that by the existing aircraft at EAFB (Table 2-3).

There would be an estimated 743 runups of C-17 aircraft per year as a result of the Proposed Action. For the purpose of the noise analysis, it is assumed that three runups would occur on an average busy day.

Furthermore, the total operations by C-130H aircraft would be reduced from 8,700 annual landings and takeoffs to 1,800 arrivals and departures per year. The number of C-130H touch-and-go flights and maintenance runups would also decrease proportionally.\*

Figure 3-7 (page 3-33) depicts the 65 dB, 70 dB, and 75 dB DNL contours after the addition of the C-17 flight operations and reduction of the C-130H aircraft that would take place under the Proposed Action.

**Evaluation of Potential Noise Impacts.** The noise contours of the Proposed Action are compared to the baseline noise contours under the No Action Alternative in Figure 3-7 (page 3-33). This comparison indicates that slight decreases in overall aircraft noise exposure would occur as a result of the introduction of C-17 aircraft and the reduction of C-130H operations at EAFB.\* Such decreases in land areas impacted by noise levels of DNL 65 dB or above would be insignificant and confined to areas within the EAFB and Fort Richardson properties. Table 4-7 is a summary of overall land areas within the three contour bands of DNL 65-70 dB, 70-75 dB, and 75 dB or above. It is not anticipated that off-base noise-sensitive areas such as the residential areas south of EAFB would be adversely affected by changes in noise levels resulting from the Proposed Action. Under the Proposed Action (Figure 3-7, page 3-33), changes in areas exposed to noise levels of DNL 65 dB or above would take place in areas along the C-17 and C-130H flight tracks departing from Runway 06. Most of the DNL 65 dB area would be within EAFB property. However, some new off-base water areas within Knik Arm, north of EAFB, might be exposed to DNL 65 dB. It is not expected that off-base lands would be significantly affected by noise level changes under the Proposed Action.

Beluga whales are the main wildlife species of concern potentially affected by noise associated with the proposed C-17 beddown at EAFB. Beluga whales are often observed beneath approach corridors for Anchorage International Airport, Merrill Field, and EAFB. The proposed *Initial F-22 Operational Wing Beddown Final Environmental Impact Statement*

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\* To continue to supply remote DoD sites in Alaska and Canada, it is expected that four smaller cargo aircraft with characteristics similar to C-130 aircraft will continue to operate from Kulis ANGB or on a contract basis. For the purpose of analysis, it is conservatively assumed that four C-130 aircraft represent the supply aircraft.

\* To continue to supply remote DoD sites in Alaska and Canada, it is expected that four smaller cargo aircraft with characteristics similar to C-130 aircraft will continue to operate from Kulis ANGB or on a contract basis. For the purpose of analysis, it is conservatively assumed that four C-130 aircraft represent the supply aircraft.

**TABLE 4-7**

Comparison of Noise Contour Areas of the Proposed Action to the No Action Alternative  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

DNL (dB)	Land Area (acres)		Percent Change Relative to No Action Alternative
	No Action Alternative	Proposed Action	
65-70	5,352.8	5,185.5	-3.1%
70-75	1,864.8	1,854.9	-0.5%
75 or above	2,302.3	2,284.6	-0.8%
Source: AFCEE, 2002			

concluded that noise exposure levels would not be expected to affect these whales (USAF, 2001). Since the C-17 aircraft do not create sonic booms and result in only slight increases in DNL exposure near EAFB and over water, it is not expected that the proposed C-17 beddown would result in adverse effects on the whales either.

#### 4.8.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. Noise exposure around EAFB would continue to remain at existing levels. These are identified as “Baseline Noise Contours” on Figure 3-7 (page 3-33). Military aircraft noise exposure levels of DNL 65 dB or higher would continue to be primarily confined to areas within EAFB and Fort Richardson. Only a very small area within north Anchorage, near the EAFB boundary, would be exposed to noise levels near DNL 65 dB.

## 4.9 Safety

Safety is paramount in all operations at EAFB. USAF regulations, guidance, and technical orders all emphasize the accomplishment of tasks in a manner that either reduces or eliminates the probability of a mishap occurring. Procedures and practices are also in place that are designed to reduce the impact of a mishap in the event that something goes wrong. The higher a hazard and resulting risk presented by an operation, the more extensive the safety procedures and requirements.

### 4.9.1 Impacts Criteria

For the Proposed Action and the No Action Alternative, the effect of the action on ground, weapons/explosives, and flight safety was evaluated relative to the degree that an action increases or decreases safety.

### 4.9.2 Impacts

Impacts to ground, weapons/explosives, and flight safety were evaluated for both the Proposed Action and the No Action Alternative.

#### 4.9.2.1 Proposed Action

**Ground and Weapons/Explosives Safety.** Overall, the missions of both the C-130 and the C-17 aircraft are very similar. Both types of aircraft transport cargo and personnel and conduct airdrops of troops and materials. However, the C-17 is a turbofan aircraft that can carry approximately 4.5 times more cargo than the C-130 and can execute both tactical and strategic airlift missions. The C-130 is a turboprop aircraft that is primarily dedicated to tactical airlift missions. Though these differences between the two aircraft would require different specific ground handling and loading procedures, as well as different maintenance procedures, the same USAF regulations and instructions for ground and weapons/explosives safety would still apply. Additionally, the expected safety outcomes and metrics would remain the same. As a result, the beddown of the C-17 aircraft at EAFB would not change the existing ground and weapons/explosives safety environment.

**Flight Safety.** Currently, the lifetime Class A mishap rate for the C-17 is 1.29 for every 100,000 flying hours and the lifetime Class B mishap rate for the C-17 is 5.53 for every 100,000 flying hours (Gueterslosh, 2004). These lifetime mishap rates are poor when compared to the lifetime Class A and Class B rates for the C-130. The lifetime Class A mishap rate for the C-130 is 0.91 for every 100,000 flying hours and the lifetime Class B mishap rate for the C-130 is 1.25 for every 100,000 flying hours (Froeschner, 2004).

Eight operational aircraft (C-17) would be replacing 18 operational aircraft (C-130) and 80 percent of the C-17 aircraft's missions would be flown outside of Alaska. Therefore, the number of aircraft sorties would be reduced from the current number of sorties that are flown by the C-130 aircraft. Because the number of sorties would be reduced, the probability of an accident would also be reduced. In addition, the C-17 is a larger profile aircraft than the C-130. Because larger profile aircraft usually have lower mishap rates, the chances of a mishap would be further reduced. Therefore, it is not expected that the beddown of the C-17 aircraft would adversely impact the flight safety environment at EAFB.

**BASH.** EAFB's BASH program is designed to reduce the chances of aircraft strikes for all types of aircraft, not just the C-130 or the C-17. It is not expected that there would be alterations necessary because of the beddown of the C-17 aircraft at EAFB. Since 18 C-130s would be replaced by 8 C-17s, it is possible that the number of bird-aircraft strikes would be reduced. Consequently, the beddown of the C-17 would not impact the BASH hazard at EAFB.

#### 4.9.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action Alternative would not alter the ground, weapons/explosives, or flight safety environments or the BASH hazard.

## 4.10 Transportation and Circulation

### 4.10.1 Impacts Criteria

Annual average daily traffic counts for roadways near EAFB were used to determine if adverse effects related to the C-17 beddown could be expected due to the increase in traffic on the existing transportation system. A 3 percent growth rate was used to project traffic counts through 2007, when the arrival of the C-17s is expected.

### 4.10.2 Impacts

Traffic volumes were obtained from the Municipality of Anchorage Area Transportation Study (AMATS) travel demand model for 1999 (Municipality of Anchorage Transportation Planning Department, 1999). Some basic assumptions on impacts were made on roadways serving EAFB related to these forecasts. All of the 135 new personnel are expected to be in-migration (that is, coming from outside EAFB). It is projected that 80 percent of those personnel would live off base. If so, there would be approximately 108 single occupancy vehicle (SOV) trips daily (one-way) to the local travel network near the EAFB gate locations if all of the estimated new households made a peak-period work trip.

#### 4.10.2.1 Proposed Action

The current transportation system is adequate to meet the present and future needs of the installation based on projected growth. All roadways are inspected and rated annually according to the Pavement Condition Index (PCI) in order to monitor system needs. Currently, there is some congestion at the intersection of Arctic Warrior Drive and Davis Highway. However, the number of SOV trips projected as a result of the additional personnel related to the Proposed Action would not adversely affect the existing transportation system.

#### 4.10.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action Alternative would not change the current transportation and circulation conditions on EAFB. The current congestion at the intersection of Arctic Warrior Drive and Davis Highway would remain the same.

## 4.11 Hazardous Materials and Waste

### 4.11.1 Impacts Criteria

For the Proposed Action and the No Action Alternative, the effects of development in an area with land use controls in place were evaluated relative to the degree that the action impacts the land use controls or potentially increases or decreases threats to human health or the environment.

### 4.11.2 Impacts

Sites identified during the review of environmental condition of property maps were further evaluated to determine direct impacts related to construction efforts in the C-17 beddown area. This evaluation consisted of reviewing the EAFB Management Action Plan (EAFB, 2001c) and investigation summary reports as well as conversations with 3 CES/CEV project managers responsible for managing the sites considered in the analysis.

#### 4.11.2.1 Proposed Action

Only one contaminated area, the fire training area (FT23) and the nearby UST, could directly affect the C-17 beddown Proposed Action. The principal sources of contamination at FT23 include residual fuels and solvents spread on the ground for fire training exercises and fuel supply lines to the fire training pit and petroleum contamination from a former 22,000-gallon UST adjacent to FT23. Drums suspected to have been buried in the southern portion of a construction rubble pile east of the fire training area may also be a source of contamination to the construction program. Fire training activities in the area ceased in 1991. The UST and associated contaminated soil to 12 feet bgs have been removed.

Currently, there are two bioventing treatment systems actively operating at FT23. The first system is operating in one well in the location of the previously removed UST to treat deep contamination not excavated during the UST removal. The second bioventing system is operating in two deep wells in the location of the former fire training burn pit. Shallow pockets of contamination might exist at the site when construction occurs and would be managed in accordance with applicable regulations.

It should be noted that facilities related to the C-17 beddown Proposed Action are sited partially within OU 4 West. In addition to constraints associated with contaminated soil, OU 4 West has a land use control in effect. The land use control specifies OU 4 West as an "Airfield Use Area" designated for aircraft operations and maintenance, which include active and inactive runways, taxiways, and parking aprons for aircraft. The establishment of residential development of the area is strictly prohibited.

The OU 4 Record of Decision (ROD), signed in September 1995 (EAFB, 1995), describes the land use controls in place at OU 4 to protect human health and the environment. At the time the ROD was signed, it was expected that all soils would be cleaned up within 11 years. If the soils have not reached clean up levels by the time construction of the Proposed Action begins, a Post-ROD amendment could be issued that would allow contaminated soil to be removed at the time of construction.

Since this is an Airfield Use Area only and would be developed for aircraft operations and maintenance, the construction of the Proposed Action could occur without causing impacts to the existing conditions.

Groundwater monitoring wells installed in the area proposed for construction of the new C-17 support facilities might be abandoned in order to accommodate the construction program. All wells abandoned would follow Alaska Department of Environmental Conservation (ADEC) guidance. Wells providing critical monitoring data would be replaced as required.

It is not expected that operation and maintenance of C-17 aircraft at EAFB would introduce new hazardous materials or generate increased quantities of hazardous waste above current levels.

#### 4.11.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. Under the No Action Alternative, there would be no threat to human health or the environment related to hazardous materials and waste. The land use controls currently in place would remain until contaminant concentrations in the bioventing areas are below cleanup levels, at which time bioventing would be discontinued.

## 4.12 Socioeconomics

### 4.12.1 Impacts Criteria

Impacts to social and economic conditions would occur if there was a need for new or increased public services, over- or under-capacity of schools, or increased or decreased economic stability.

### 4.12.2 Impacts

#### 4.12.2.1 Proposed Action

**Economic Activity.** Current economic conditions are stable and the Anchorage economy would benefit from the increase in military personnel and operations expected in Alaska over the next several years. In addition, beneficial impacts to the economy would be expected as a result of the \$117.5 million in construction to support the C-17 beddown.

**Population and Housing.** EAFB has recently undergone construction of additional housing units and dormitories. It is expected that these additional accommodations would be able to absorb the increases in military personnel and their associated families resulting from the C-17 beddown.

**Public Services.** No adverse impacts would be expected from the increase in personnel anticipated as a result of the Proposed Action related to police services, fire protection services, or medical services provided by the 3rd Mission Support Group, the Anchorage Police Department, the DoD/VA Joint Venture Medical Treatment Center, and the Mutual Aid agreements in place with the Anchorage Fire Department, State of Alaska International Airport Aircraft/Rescue/Fire Service, EAFB Fire Department, Fort Richardson Fire Department, Girdwood Volunteer Fire Department, and Chugiak Volunteer Fire Department.

Orion Elementary School is currently at or over capacity. However, Mt. Spurr Elementary School could accept additional students. In addition, most of the elementary schools have extra rooms available that could accommodate additional students with the hiring of more instructors. Central Middle School is over capacity. However, additional students could be absorbed through other schools within the Anchorage School District.

**Environmental Justice and the Protection of Children.** No disproportionate effects would be expected on minority and low-income populations or on children as a result of the Proposed Action.

#### 4.12.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and the \$117.5 million in construction of support facilities related to the C-17s would not occur. The No Action alternative would not alter socioeconomic conditions.

## 4.13 Cultural Resources

### 4.13.1 Impacts Criteria

The effects of the Proposed Action and the No Action Alternative on cultural resources were analyzed relative to:

- Potential damage to or loss of any cultural artifacts
- Impacts to traditional cultural resources

### 4.13.2 Impacts

#### 4.13.2.1 Proposed Action

The Proposed Action would be confined to an area of existing taxiways, hangars, and other support facilities. No impacts to historic, archeological, or other cultural resources would be expected as a result of the Proposed Action.

The three historic resources that are in the vicinity of the Proposed Action (Buildings 15515, 15532, and 14545) are documented and managed in accordance with the ICRMP (EAFB, 2003c).

In the event that cultural resources were discovered during any activity on EAFB, the procedures in the ICRMP (EAFB, 2003c) for unanticipated archaeological discoveries would be followed to maintain compliance with applicable regulations and established procedures for the protection and conservation of cultural resources.

#### 4.13.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action Alternative would not alter cultural resources.

## 4.14 Visual Resources/Aesthetics

### 4.14.1 Impacts Criteria

The visual effects a project has on an area depend in part on the sensitivity of views of or from the area. For this Proposed Action, areas generally recognized as sensitive include the following:



- **Residential Areas.** The area of the Proposed Action is predominantly industrial development around the airfield. Concentrated residential areas are located south of the airfield and cantonment area.
- **Areas of Recognized Scenic Beauty.** The northern section of EAFB is heavily forested and undeveloped and contains vegetation corridors shared by moose, bear, and other animals. The Chugach Mountains are visible to the south and east of the airfield. The Alaska Range is visible to the west. EAFB has nine designated visual districts, one of which is the Air Operations District.
- **Parks and Recreation Areas.** EAFB has many green spaces, a golf course, and recreation areas.

## 4.14.2 Impacts

### 4.14.2.1 Proposed Action

The north ramp of the airfield is the location of the Proposed Action. Views beyond the proposed development would not be affected. Views to the proposed development would not change in character and would include the addition of a large hangar/maintenance building, which is consistent with the surrounding airfield-related facilities. The large airframe hangar would be new construction.

The Proposed Action would not cause a negative impact to the visual character of the airfield or surrounding uses.

### 4.14.2.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. Under the No Action Alternative, visual resources would not be altered.

## SECTION 5

# Cumulative Impacts

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The analysis of potential cumulative effects as defined by the CEQ (40 CFR 1508.7; EPA CEQ, 2001) requires that the predicted direct and indirect effects of a Proposed Action and its alternatives be examined in combination with the predicted effects of other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In general, the analysis of cumulative impacts takes into consideration all the recent and thorough environmental analyses conducted in the region of interest and incorporates them by reference where relevant. Coincident effects would be possible if the geographic and time boundaries for the effects of the Proposed Action and past, present, and reasonably foreseeable future actions overlapped.

This section includes:

- Present Actions
- Other Ongoing Actions
- Reasonably Foreseeable Future Actions
- Summary of Cumulative Impacts

## 5.1 Present Actions

### 5.1.1 Proposed Action

The proposed action consists of C-17 beddown, operation, and construction projects at EAFB. As indicated in Section 4 of this EA, the Proposed Action would not result in significant direct or indirect effects associated with geological resources, land use, coastal zone management, biological resources, water resources, air quality, airspace management, noise, safety, transportation and circulation, hazardous materials and waste, socioeconomics, cultural resources, or visual resources/aesthetics related to EAFB.

### 5.1.2 No Action Alternative

Under the No Action Alternative, C-17 aircraft would not be based at EAFB and construction of support facilities related to the C-17s would not occur. The No Action Alternative would not alter the existing (baseline) conditions described in Section 3 of this EA.

## 5.2 Other Ongoing Actions

### 5.2.1 C-17 Flight Training Areas

If the Proposed Action is carried forward, there would be C-17 flight training missions in Alaskan airspace. A *C-17 Flight Training Areas EA* (CH2M HILL, 2004 in process) will

address the predicted impacts of these missions. The proposed C-17 training missions would probably use existing approved military training routes, military operation areas, restricted areas, slow-speed routes for low altitude training, and air refueling routes while functioning within existing operational parameters. Therefore, no change to existing airspace routes because of C-17 operations would be proposed and no significant impacts would be expected from the flight training missions.

### **5.2.2 Transformation of 172nd Infantry Brigade to a Stryker Brigade**

The U.S. Army has proposed to transform the current Legacy force to an Objective force during the next 30 years. As part of this action, the 172nd Infantry Brigade at Fort Wainwright, Alaska, and Fort Richardson, Alaska, were scheduled to be transformed into a Stryker Brigade Combat Team by May of 2005. The *Transformation of U.S. Army Alaska Environmental Impact Statement* (CEMML, 2004) evaluated the probable environmental impacts of this action. The date of deployment is no longer certain.

C-17 aircraft would be used to support deployment of the 172nd Stryker Brigade. The airspace use projected for the Proposed Action covers this support.

Under the No Action Alternative, the C-130 aircraft would likely be used to support deployment of the 172nd Stryker Brigade. Since the C-130s have a smaller cargo capacity, additional flights would be needed to adequately support this U.S. Army mission. Therefore, additional airspace use would probably occur.

## **5.3 Reasonably Foreseeable Future Actions**

The U.S. military is mandated to maintain readiness to protect our country. In addition to military commitments, the DoD engages in worldwide humanitarian aid. Some changes in support facilities at EAFB are expected over time in response to changing military needs. Changes that occur through the USAF planning process require assessments of predicted impacts. These types of actions would be considered within an appropriate NEPA process.

### **5.3.1 Additional Housing at EAFB Financed by the Private Sector**

As a solution to the need for additional housing, private-sector financing would be used to renovate and replace existing military family housing on EAFB and to construct additional units and an access road on undeveloped land on Fort Richardson. The "Phase II Private Sector Financed Military Family Housing Project" for EAFB is scheduled to begin in late 2004 or early 2005 (EAFB, 2004). This would result in an increase in construction activities and the number of construction workers on EAFB.

### **5.3.2 Stationing of F-22 Aircraft at EAFB**

The stationing of F-22 aircraft at EAFB was an option not selected during the initial F-22 EIS process (USAF, 2001). However, as missions change, F-22 aircraft could be stationed at EAFB.

### 5.3.3 Increases in Personnel at EAFB

If future actions bring more personnel onto EAFB, changes to on-base traffic controls at appropriate intersections might be required.

## 5.4 Summary of Cumulative Impacts

### 5.4.1 Proposed Action

The results of the analysis of the direct and indirect effects of the Proposed Action and the cumulative impacts are that there would be no significant impacts on the physical, biological, or social components of the affected environment and cumulative impacts would not be significant. Table 5-1 summarizes the findings of this EA related to the Proposed Action.

**TABLE 5-1**

Summary of the Predicted Direct and Indirect Effects Related to the Proposed Action  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

EA Element	Potential Impact
Geological Resources	The site of the Proposed Action is an existing airfield with flat terrain. Since it is anticipated that there would be minimal excavation for footings, minimal site grading, and no surface water within the extent of the Proposed Action, no adverse impacts would be expected.
Land Use	The area is currently involved in the same type of activities as the Proposed Action. The Proposed Action would not adversely impact current activities in the area and would adhere to the land use recommendations presented in the installation's General Plan (PACAF, 2004 in process) and its 50-year plan (USAF 3 CES/CECD, 2003).
Coastal Zone Management	The C-17 beddown location is not within the 150 acres of shoreline that are within the coastal zone boundary managed by EAFB. Therefore, no impacts to coastal areas would be expected as a result of the Proposed Action.
Vegetation	Since the area is already largely developed and paved, no additional adverse impact to floral communities would be expected.
Wetlands	No wetlands are within the Proposed Action area. Surface water runoff patterns would not change. Therefore, no downgradient wetlands would be affected.
Wildlife	The area is already developed. Temporary changes in urban wildlife behavior might result from additional or differing noise conditions during construction and operations. However, no long-term changes from existing conditions would be expected. In addition, the Cook Inlet beluga whales would not be exposed to noise levels different from current levels.
Threatened and Endangered Species	Since there are no known threatened or endangered species at EAFB, no adverse impacts would be expected.
Other Protected Species	It is not expected that bald eagles or marine mammals would be adversely impacted by the Proposed Action.

**TABLE 5-1**

Summary of the Predicted Direct and Indirect Effects Related to the Proposed Action  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>EA Element</b>	<b>Potential Impact</b>
Water Resources	<p>There are no streams, creeks, ponds, or lakes in the immediate construction area. Storm water quality would be protected by implementation of BMPs as specified in the EAFB's Storm Water Pollution Prevention Plan. The slight increase in impervious surface would not alter groundwater recharge or percolation. Therefore, downgradient streams, creeks, ponds, and lakes would not be directly impacted.</p> <p>Any initial construction impacts and longer term cumulative impacts would affect only the Cook Inlet. No adverse impact would be expected to freshwater resources.</p>
Air Quality	<p>There would be a slight increase (6 percent or less) in emissions from stationary sources due to increased space heating and C-17 touch-up painting. Emissions from mobile sources, including the increase in commuter traffic, would increase during construction and operation. However, it is not projected that increases would result in a non-attainment condition at EAFB, in the Municipality of Anchorage, or in the Anchorage Bowl. Additionally, since EAFB is over 100 kilometers from any Class I areas, the increased emissions of SO<sub>x</sub> and NO<sub>x</sub> would not impact the visibility index in a Class I area.</p>
Airspace Management	<p>The existing airspace structure is sufficient and no change to the EAFB or Anchorage Terminal Area airspace structure or management would be required.</p>
Noise	<p>Proposed Action noise levels would be compatible with the USAF noise level criterion over residential and other noise-sensitive land uses. The over water noise levels would increase only slightly and would not result in adverse effects on beluga whales.</p>
Safety	<p>The Proposed Action would not change the existing ground and weapons/explosives safety environment at EAFB. In addition, it is not expected that the beddown of the C-17 aircraft would adversely impact the flight safety environment or the BASH hazard at EAFB.</p>
Transportation and Circulation	<p>The current transportation system would be adequate.</p>
Hazardous Materials and Waste	<p>One contaminated site, the fire training area (FT23), and the nearby UST are within the Proposed Action area of affect. Contaminated soil is being remediated with in situ bioventing systems. Shallow pockets of contamination might exist at the site when construction occurs and would be managed in accordance with applicable regulations.</p> <p>The Proposed Action would be compatible with the land use controls associated with this site. If the soils have not reached clean up levels by the time construction of the Proposed Action begins, a Post-ROD amendment could be issued that would allow contaminated soil to be removed at the time of construction.</p> <p>Groundwater monitoring wells installed in the area proposed for construction of the new C-17 support facilities might be abandoned in order to accommodate the construction program. All wells abandoned would follow ADEC guidance. Wells providing critical monitoring data would be replaced as required.</p> <p>It is not expected that operation and maintenance of C-17 aircraft at EAFB would introduce new hazardous materials or generate increased quantities of hazardous waste above current levels.</p>
Socioeconomics	<p>There would be approximately 135 additional personnel required at EAFB with the Proposed Action. No adverse impacts would be expected within the region of influence from this increase in personnel and their associated families.</p> <p>Beneficial impacts to the economy would be expected as a result of the construction of the Proposed Action.</p> <p>No disproportionate effects would be expected on children or on disadvantaged or minority groups as a result of the Proposed Action.</p>

**TABLE 5-1**

Summary of the Predicted Direct and Indirect Effects Related to the Proposed Action  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>EA Element</b>	<b>Potential Impact</b>
Cultural Resources	The Proposed Action would be confined to an area of existing taxiways, hangars, and other support facilities. No impacts to historic, archeological, or other cultural resources would be expected as a result of the Proposed Action. The three historic resources that are in the vicinity of the Proposed Action (Buildings 15515, 15532, and 14545) are documented and managed in accordance with the ICRMP (EAFB, 2003c).
Visual Resources/ Aesthetics	The Proposed Action would not cause a negative impact to the visual character of the airfield or surrounding uses.
Cumulative Impacts	The Proposed Action would not result in a significant cumulative impact as part of the identified ongoing and concurrent activities associated with geological resources, land use, coastal zone management, biological resources, water resources, air quality, airspace management, noise, safety, transportation and circulation, hazardous materials and waste, socioeconomics, cultural resources, or visual resources/aesthetics related to EAFB.

### 5.4.2 No Action Alternative

The results of the analysis of the direct and indirect effects of the No Action Alternative and the cumulative impacts are that there would be no significant impacts on the physical, biological, or social components of the affected environment and cumulative impacts would not be significant. Table 5-2 summarizes the findings of this EA related to the No Action Alternative.

**TABLE 5-2**

Summary of the Predicted Direct and Indirect Effects Related to the No Action Alternative  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>EA Element</b>	<b>Potential Impact</b>
Geological Resources	The site of the No Action Alternative is an existing airfield with flat terrain. No adverse impacts would be expected.
Land Use	The No Action Alternative area currently supports airlift and other large frame aircraft operations and maintenance activities. No adverse impacts would be expected.
Coastal Zone Management	Since the No Action Alternative is not within the 150 acres of shoreline that are within the coastal zone boundary managed by EAFB, no impacts to coastal areas would be expected.
Vegetation	The No Action Alternative area is already developed. No natural vegetation or habitat would be adversely impacted.
Wetlands	No wetlands are within the No Action Alternative area. Surface water runoff patterns would not change. Therefore, no downgradient wetlands would be affected.
Wildlife	The No Action Alternative area is already developed. Wildlife impacts would not be expected.
Threatened and Endangered Species	There are no known threatened or endangered species at EAFB. No adverse impacts would be expected.

**TABLE 5-2**

Summary of the Predicted Direct and Indirect Effects Related to the No Action Alternative  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*

<b>EA Element</b>	<b>Potential Impact</b>
Other Protected Species	It is not expected that bald eagles or marine mammals would be adversely impacted by the No Action Alternative.
Water Resources	There are no streams, creeks, ponds, or lakes in the area. The No Action Alternative would not alter groundwater recharge or percolation. Therefore, downgradient streams, creeks, ponds, and lakes would not be affected.
Air Quality and Climate	The No Action Alternative would not increase emissions from stationary or mobile emissions sources.
Airspace Management	The existing airspace structure under the No Action Alternative would be adequate for containing and routing existing and projected future increases in civilian and military aircraft operations within the vicinity of EAFB and the Anchorage Terminal Area airspace.
Noise	Under the No Action Alternative, noise exposure around EAFB would continue to remain at existing levels ("Baseline Noise Contours"). These noise levels would be compatible with the USAF noise level criterion over residential and other noise-sensitive land uses.
Safety	The No Action Alternative would not alter the ground, weapons/explosives, or flight safety environments or the BASH hazard.
Transportation and Circulation	The No Action Alternative would not change the current transportation and circulation conditions on EAFB. The current congestion at the intersection of Arctic Warrior Drive and Davis Highway would remain the same.
Hazardous Materials and Waste	Under the No Action Alternative, there would be no threat to human health or the environment related to hazardous materials and waste. The land use controls currently in place would remain until contaminant concentrations in the bioventing areas are below cleanup levels, at which time bioventing would be discontinued.
Socioeconomics	The No Action Alternative would not alter socioeconomic conditions.
Cultural Resources	The No Action Alternative area would not alter cultural resources.
Visual Resources/Aesthetics	Under the No Action Alternative, visual resources would not be altered.
Cumulative Impacts	The No Action Alternative would not result in a significant cumulative impact as part of the identified ongoing and concurrent activities associated with geological resources, land use, coastal zone management, biological resources, water resources, air quality, noise, safety, transportation and circulation, hazardous materials and waste, socioeconomics, cultural resources, or visual resources/aesthetics related to EAFB. However, with the No Action Alternative, the existing C-130 aircraft squadron would likely be used to support a portion of the needs of the 172nd Stryker Brigade. Since the C-130s have a smaller cargo capacity, additional flights would be required. Therefore, additional airspace use would probably occur.

## SECTION 6

# Public Comments on Draft EA

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The purpose of this section is to document and respond to public comments received during the Draft EA public review period. The USAF issued a news release informing the public about the project and the opportunity to provide comments on the Draft EA. A copy of the news release is provided as Figure 6-1.

The USAF received no public comments on the Draft EA during the 30-day public review period that ended on August 10, 2004.

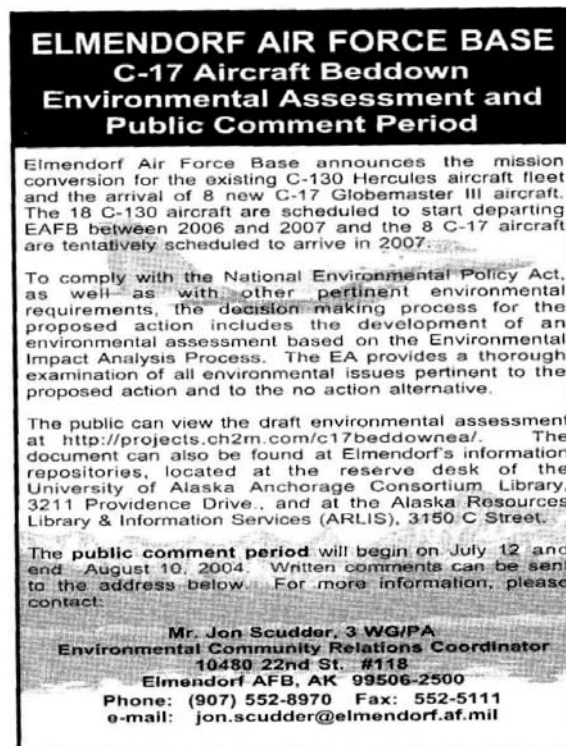


FIGURE 6-1  
Notice of Availability of Draft EA  
*C-17 Beddown Environmental Assessment*  
*Elmendorf Air Force Base, Alaska*



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## SECTION 7

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## SECTION 8

# List of Preparers

---

This NEPA document was prepared by the following CH2M HILL team members:

- Tad Dean
- Farshad Farhang
- Chris Menefee
- Deborah Moore
- Matt Flynn
- Chris Love
- Jane Gendron
- Mwasi Mwamba
- Erin Cox
- Jennifer Hepner
- Roch Player
- Nichole Rehm
- Marko Radonich



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# **Appendix A**

## **Air Quality Conformity Consultation**

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# Interagency Consultation -- General Air Quality Conformity Applicability Determination

## Elmendorf AFB C-17 Beddown Program

ATTENDEES: Paula Fowler -- Elmendorf AFB Air Quality Program Manager  
Debra Suzuki -- USEPA Region X  
Barbara Shepherd -- ADEC  
Steve Morris -- Munic. of ANC  
Ed Powell -- CH2M HILL  
Mark Bennett -- CH2M HILL  
Tad Dean -- CH2M HILL

COPIES: Project File -- 167122

FROM: Tad Dean -- CH2M HILL

DATE: April 5, 2002

## General

An interagency consultation was conducted to determine if a general conformity analysis would be required for the Elmendorf AFB C-17 Beddown project. This meeting summary documents key points discussed during the teleconference.

## Agenda

The following agenda was followed during the teleconference:

- Introductions
- Purpose of the call
- Project background
- General conformity discussion
- Wrap Up

## Introductions

Project team introductions were made prior to initiating discussions.

## Objective

The purpose of the call was to provide the regulatory agencies sufficient information regarding the project, to determine if a general conformity analysis would be required for the project, and to document the decision.

## Project Background

Elmendorf Air Force Base (EAFB) is anticipating to receive up to eight C-17 aircraft between 2004 and 2011. These aircraft are new to the base and no aircraft will be removed as a result of the project. The project involves both direct and indirect emissions of regulated air pollutants. General Conformity requires all federal projects to conform to applicable State Implementation Plans (SIPs) to ensure the actions do not interfere with strategies employed to attain the National Ambient Air Quality Standards (NAAQS). An applicability analysis is conducted to determine if a conformity determination is required for the project.

A conformity determination is required for federal actions that involve releasing a criteria pollutant in an area that is classified as non-attainment for that pollutant. The Anchorage area is classified as not attaining the NAAQS for carbon monoxide (CO). The southern boundary of EAFB forms the northern boundary of the existing CO non-attainment area for Anchorage. Therefore, EAFB is not in the non-attainment area and actions conducted within EAFB boundaries do not require a conformity determination.

The analyses require including both direct emissions and indirect emissions. Direct emissions caused by the project will be conducted inside the boundaries of EAFB and are not included in the analysis. Direct emissions caused by the project include emissions from aircraft operations, aircraft support equipment, maintenance operations, building heating, and vehicle travel.

Indirect emissions will be released within the boundaries of the Anchorage CO non-attainment area as a result of the project and must be included in the applicability analysis. These indirect emissions are from employee vehicles and construction-related vehicles traveling to and from EAFB as a result of the project.

The threshold for requiring a conformity determination for CO is 100 tons per year. A preliminary estimate of emissions of CO released in the non-attainment area is 19 tons per year. This estimate was made using the Emissions and Dispersion Modeling System (EDMS) computer model published by the Federal Aviation Administration in conjunction with the USAF. It was developed to assess the air quality impacts of proposed airport development projects. The EDMS is primarily used for mobile sources, including vehicles, and uses emission rates from the EPA's Mobile5.a model to estimate emissions from vehicles.

## General Conformity Discussion

It was noted that the calculated emissions appear elevated as compared to other projects. This is because the C-17 aircraft are being added to the existing air fleet at Elmendorf AFB,

with no anticipated reduction in other aircraft. It was further noted that assumptions used to calculate the emissions were conservative since detailed design data are not available at this stage of the project. For example, it is assumed that approximately 650 people will be required to support this new mission; it was further assumed that 80 percent of these people would be commuting from off-base residential areas.

Steve Morris/Municipality of Anchorage asked if emissions from incidental travel (such as trips to the grocery store) were included in the inventory of CO emissions released in the non-attainment area. These emissions were not included in the conformity determination since EAFB has no control over them. Trips to and from EAFB were included because EAFB can require carpooling, provide buses, etc. thereby they have some control over the emissions.

The applicability of General Conformity to the project was discussed. Emissions of CO released into the Anchorage CO non-attainment area as a result of construction of the project are not expected to exceed the 100 ton of CO per year threshold requiring a conformity determination. Therefore, it was agreed amongst all present that General Conformity does not apply to the proposed C-17 Beddown project.

The USEPA asked if the Alaska Department of Transportation (ADOT) has anticipated increased traffic to Elmendorf AFB as part of their transportation plan. The Municipality of Anchorage indicated that they will call the ADOT to make this determination (John Spring, 343-7994).

## Wrap-Up

It was agreed that the decision of General Conformity non-applicability will be documented in these meeting notes. The meeting notes will be included in the draft environmental assessment report, which will be submitted to EAFB near the end of June 2002.

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## **Appendix B**

# **Noise Analysis Technical Memorandum**

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*Technical Memorandum*

# Noise Analysis

**Appendix B of  
Environmental Assessment  
C-17 Beddown  
Elmendorf Air Force Base, Alaska**



Prepared for  
**United States Air Force  
3rd Civil Engineer Squadron  
Elmendorf Air Force Base, Alaska**

Prepared by  
**CH2MHILL**  
301 West Northern Lights Boulevard, Suite 601  
Anchorage, Alaska 99503-2662  
(907) 278-2551

September 2004



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# Abbreviations

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°F	degrees Fahrenheit
μN/m <sup>2</sup>	micro Newtons per square meter
μPa	micro Pascals
AACS	Airborne Air Control Squadron
AFCEE	Air Force Center for Environmental Excellence
AICUZ	Air Installation Compatible Use Zone
AKANG	Alaska Air National Guard
ALZ	assault landing zone
CFR	<i>Code of Federal Regulations</i>
dB	decibel
dBA	A-weighted decibel
DNL	Day-Night Average Noise Level
DZ	drop zone
EAFB	Elmendorf Air Force Base
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FICON	Federal Interagency Committee on Noise
FS	Fighter Squadron
GIS	Geographic Information System
HUD	U.S. Department of Housing and Urban Development
L <sub>dn</sub>	Day-Night Average Noise Level
L <sub>max</sub>	Maximum Noise Level
MCM	Master Control Module
NA	not applicable
OSHA	Occupational Safety and Health Administration
RH	relative humidity
SEL	Sound Exposure Level
SPL	sound pressure level

USAF	U.S. Air Force
VA	U.S. Department of Veterans Affairs

## SECTION B.1

# Introduction

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The U.S. Air Force (USAF) proposes to add new C-17 Globemaster III aircraft to the existing aircraft fleet at Elmendorf Air Force Base (EAFB), Alaska. The proposed action is for EAFB to beddown and operate up to eight new C-17 aircraft, which are tentatively scheduled to arrive in 2007.

This technical memorandum presents the criteria, methods, and findings of a study of potential noise effects of the proposed C-17 Beddown at EAFB, Alaska. The information contained herein will be incorporated into the environmental assessment being prepared for the effort.

## B.1.1 Fundamentals of Noise

Noise is defined as unwanted sound and is one of the most common environmental issues associated with aircraft operations. Sound is a physical phenomenon consisting of minute vibrations, which travel through a medium, such as air, and are sensed by the human ear. Whether sound is interpreted as noise depends largely on the listener's subjective reaction. Such reaction is formed from the subject's current activity, past experience, and attitude toward the sound source.

Sound pressure is measured in units of micro Newtons per square meter ( $\mu\text{N}/\text{m}^2$ ) called micro Pascals ( $\mu\text{Pa}$ ). One  $\mu\text{Pa}$  is approximately one-hundred-billionth of the normal atmospheric pressure. The pressure of a very loud sound may be 200,000,000  $\mu\text{Pa}$ , or 10,000,000 times the pressure of the weakest audible sound (20  $\mu\text{Pa}$ ). Because of this wide range, expressing sound levels in terms of  $\mu\text{Pa}$  would be very cumbersome. For this reason, sound pressure levels (SPLs) are described in logarithmic units of ratios of actual sound pressures to a reference pressure squared. These units are called bels, named after Alexander G. Bell. In order to provide a finer resolution, a bel is subdivided into decibels (deci or tenth of a bel), abbreviated dB.

Since decibel is a logarithmic unit, SPLs cannot be added or subtracted by ordinary arithmetic means. For example, if one aircraft overflight produces a SPL of 70 dB at the location of an observer, two aircraft passing simultaneously would not produce 140 dB. In fact, they would combine to produce 73 dB.

Unless otherwise stated, all sound levels reported in this report are in A-weighted decibels (dBA). A-weighted sound level is defined as the level, in decibels, measured with a sound level meter having the metering characteristics and a frequency weighting specified in the American National Standards Institute Specification for Sound Level Meters, ANSI S 1.4-1983. The A-weighting de-emphasizes lower frequency sounds below 1,000 Hertz (1 kHz) and higher frequency sounds above 4 kHz. It emphasizes sounds between 1 kHz and 4 kHz. A-weighting is the most generally used measure for evaluation of environmental

noise throughout the world. Most community noise standards utilize A-weighting, as it provides a high degree of correlation with human annoyance and health effects.

The actual impact of noise is not a function of loudness alone. The frequency, content, time of day during which noise occurs, and the duration of the noise are also important. The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, or dissatisfaction
- Interference with activities such as speech, sleep, or learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants typically experience noise effects in the last category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard is primarily due to the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to noise is by comparing it to the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

With regard to increases in A-weighted noise level, knowledge of the following relationships is helpful in understanding the human perception of changes in noise levels:

- Except in carefully controlled laboratory experiments, the human ear cannot perceive a change of 1 dB
- Outside the laboratory, a 3-dB change is considered a just-perceivable difference
- A change in level of at least 5 dB is required before a change in community response would be expected
- A 10-dB change is subjectively heard as approximately a doubling in loudness, and would generally cause an adverse community response

Table B-1-1 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

Most noise events which last more than a few seconds present variable sound intensity. Consequently, a variety of noise metrics is used to measure noise levels. The noise descriptors most often used for aircraft noise impact assessment are the Maximum Noise Level ( $L_{\max}$ ), Sound Exposure Level (SEL), and Day-Night Average Noise Level (DNL).

$L_{\max}$  is the highest sound level measured during a single event in which the sound level changes value as a function of time (e.g., an aircraft overflight).  $L_{\max}$  is important in judging the interference caused by a noise event with conversation, TV or radio listening, sleep, or other common activities.

SEL is a logarithmic measure of the total acoustic energy transmitted to the listener during a noise event. Mathematically, SEL represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying

**TABLE B-1-1**  
Typical Sound Levels Measured in the Environment and Industry

Noise Source At a Given Distance	A-Weighted Sound Level, dB(A)	Noise Environments	Subjective Impression
Shotgun	140	Carrier flight deck	
Civil defense siren (100 ft)	130		
Jet Takeoff (200 ft)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (50 ft) Ambulance siren (100 ft)	100		Very loud
Freight cars (50 ft)	90	Boiler room Printing press plant	
Pneumatic drill (50 ft) Freeway (100 ft)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (5 ft) Air conditioning unit (100 ft)	60	Data processing center Department store	
Light traffic (100 ft); rainfall Large transformer (200 ft)	50	Private business office	
Bird calls (distant)	40	Average living room library	Quiet
Soft whisper (5 ft); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		
	0		Threshold of hearing

noise event. Since aircraft overflights normally last longer than one second, the SEL of an overflight is usually greater than the  $L_{\max}$  of the overflight. SEL is a composite metric that represents both the intensity and duration of a noise event. It does not directly represent the sound level heard at any given time, but rather provides a measure of the net impact of the entire acoustic event.

DNL (or  $L_{dn}$ ) is the noise level descriptor used for the preparation of noise exposure contours and assessment of land use compatibility around military facilities. The DNL is the equivalent sound level for an average busy day of aircraft operations with a penalty of 10 dB added to sound levels occurring during the nighttime (2200 to 0700 hours). Since the DNL noise exposure maps presented in this report describe average busy day conditions,

noise exposure on any given day may be higher or lower than indicated by the noise exposure maps.

## **B.1.2 Noise Impact Criteria and Guidelines**

The main applicable criterion used to determine the level of significance of noise exposure due to the proposed action at noise-sensitive areas potentially affected is that applied by the U.S. Air Force. However, a number of other guidelines and noise effects have been discussed here to address areas of potential concern to the public.

DNL is the community noise metric recommended by the U.S. Environmental Protection Agency (EPA) and has been adopted by most federal agencies (Federal Interagency Committee on Noise [FICON], 1992). It has been well established that DNL correlates well with community response to noise (Schultz, 1978; Finegold, 1994).

### **B.1.2.1 U.S. Air Force**

The USAF has established land use noise compatibility criteria consistent with those published by the Federal Interagency Committee on Urban Noise (FICUN) in its publication, *Guidelines for Considering Noise in Land Use Planning and Control* (FICUN, 1980). The USAF noise level criterion is a DNL of 65 dB. This is the threshold of incompatibility for residential and other noise-sensitive land uses, such as schools, hospitals, and religious facilities, to be developed in the vicinity of Air Force bases.

### **B.1.2.2 Other Federal Agencies**

Other federal agencies, including the Federal Aviation Administration (FAA), the U.S. Department of Housing and Urban Development (HUD), and the U.S. Department of Veterans Affairs (VA), also apply the same criterion level of DNL 65 dB to residential and other noise-sensitive areas.

Pursuant to the Noise Control Act of 1972 (42 U.S.C. 4901 et seq.), the EPA established guidelines for noise levels “required to protect public health and welfare with an adequate margin of safety” (EPA, 1974). In its Levels Document, EPA determined that a yearly average day-night sound level of 45 dB would permit adequate speech communication in the home. The EPA recommends a noise level of DNL 55 dB or below to avoid activity interference and annoyance in outdoor areas of residential locations. These levels also apply to hospitals and educational facilities. However, the EPA guidelines do not constitute a standard, specification, or regulation.

### **B.1.2.3 Basis for Use of DNL to Assess Noise Impacts**

The use of DNL has been criticized as not accurately representing community annoyance and land-use compatibility with aircraft noise. Much of that criticism stems from a lack of understanding of the basis for the measurement or calculation of DNL. One frequent criticism is based on the perception that people react more to single noise events and not as much to “meaningless” time-averaged sound levels.

In fact, a time-averaged noise metric, such as DNL, takes into account both the noise levels of all individual events which occur during a 24-hour period and the number of times those



events occur. As described briefly above, the logarithmic nature of the decibel unit causes the noise levels of the loudest events to control the 24-hour average.

FICON found that there are no new descriptors or metrics of sufficient scientific standing to substitute for the present DNL cumulative noise exposure metric. It further recommended continuing the use of the DNL metric as the principal means for describing long-term noise exposure of civil and military aircraft operations. The FICON reaffirmed the methodology employing DNL as the noise exposure metric and appropriate dose-response relationships to determine community noise impacts.

Based on these findings, the FICON supported agency discretion in the use of supplemental noise analysis. It also recommended that further analysis should be conducted of noise-sensitive areas between DNL 60-65 dB having an increase of 3 dB or more if screening analysis shows that noise-sensitive areas at or above DNL 65 dB will have an increase of DNL 1.5 dB or more. The FICON decided not to recommend evaluation of aviation noise impact below DNL 60 dB because public health and welfare effects below that level have not been established (FICON, 1992). Within the Department of Defense, the USAF has established guidance within its Air Installation Compatible Use Zone (AICUZ) program that a 2-dB increase within the DNL 65 dB contours is an indicator of the need for further analysis.

## B.1.3 Noise Effects

### B.1.3.1 Annoyance

Studies of community annoyance from numerous types of environmental noise show that DNL is the best measure of impact. Schultz (1978) demonstrated a consistent relationship between DNL and annoyance. This relationship, referred to as the “Schultz curve,” has been reaffirmed and updated over the years (Finegold, 1994). Figure B-1-1 (page B-6) shows the current version of the Schultz curve.

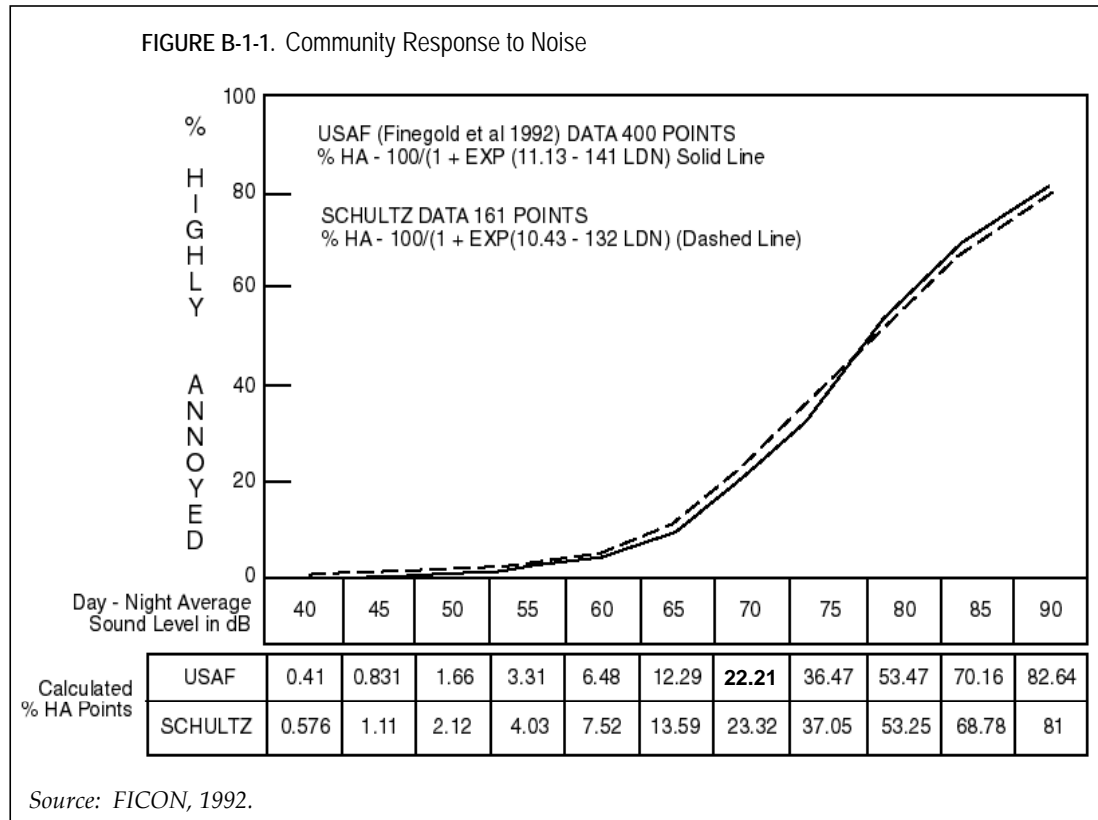
As previously stated, the EPA identified a DNL of 55 dB or less as the threshold below which adverse noise impacts are not expected (EPA, 1972). It can be seen from Figure B-1-1 (page B-6) that this is a region where a small percentage of people is highly annoyed. DNL of 65 dB is widely accepted as a level above which significant adverse impact should be expected (FICON, 1992), and it is seen from Figure B-1-1 (page B-6) that about 15 percent of people are highly annoyed at that level.

### B.1.3.2 Speech Interference

Conversational speech is in the 60 to 65 dB range, and interference with this can occur when noise enters or exceeds this range. Speech interference is one of the primary causes of annoyance. The Schultz curve incorporates the aggregate effect of speech interference on noise impact.

### B.1.3.3 Sleep Interference

Sleep interference is commonly believed to represent a significant noise impact. The 10-dB nighttime penalty in DNL is based primarily on sleep interference. Recent studies, however,

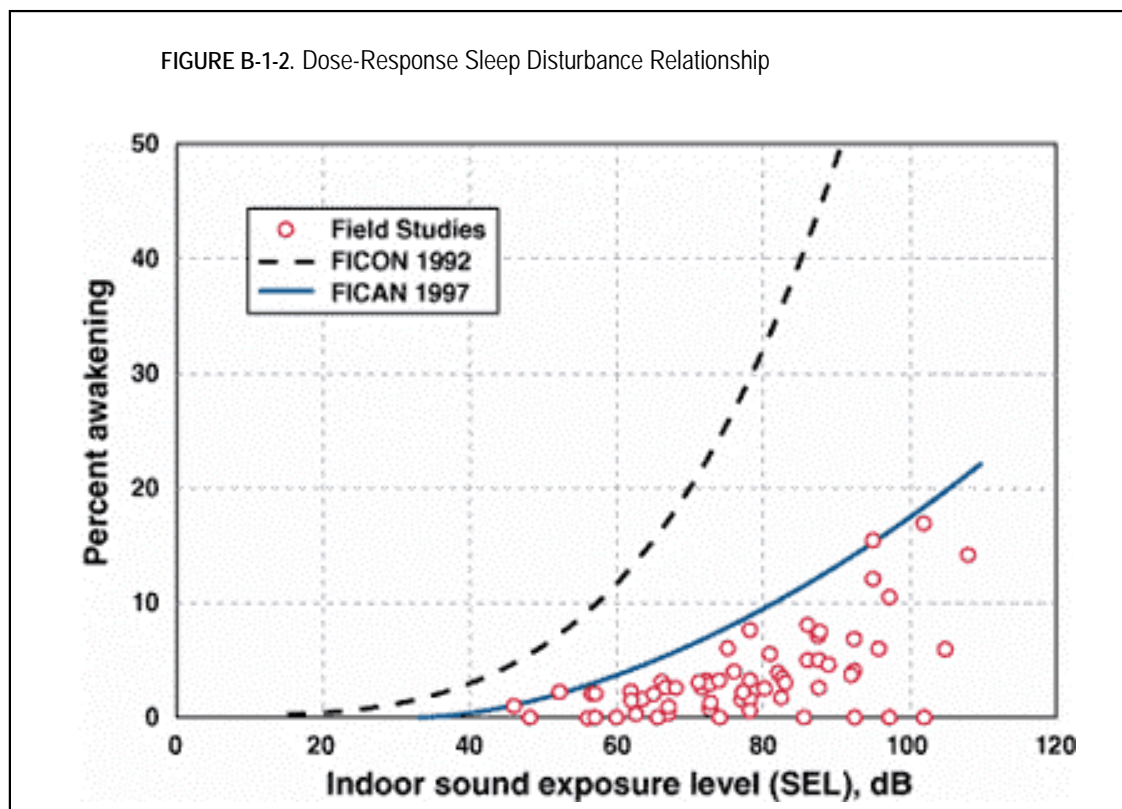


show that sleep interference due to noise is much less than had been previously believed (Pearsons, 1989; Ollerhead, 1992).

The Federal Interagency Committee on Aviation Noise (FICAN) has evaluated the data and conclusions from a number of field studies related to sleep disturbance due to noise from aircraft events (FICAN, 1997). The “FICAN 1997” curve shown in Figure B-1-2 (page B-7) predicts a conservative dose-response relationship for the combined field data. The curve represents the upper limit of the observed field data, and should be interpreted as predicting the “maximum percent of the exposed population expected to be behaviorally awakened”, or the “maximum % awakened” for a given residential population.

#### B.1.3.4 Hearing Loss

Federal Occupational Safety and Health Administration (OSHA) guidelines (Title 29, *Code of Federal Regulations* [CFR] 1910.95) specify maximum noise levels to which workers may be exposed on a regular basis without hearing protection. Workplace standards allow a time-average A-weighted noise level of 90 dB over eight hours, or 85 dB averaged over a 16-hour period. Standards allow exposure to 115 dB for up to 15 minutes per day and a time-average sound level of 70 dB over a 24-hour period. Exceeding these levels on a daily basis over a working career is likely to lead to hearing impairment. It is unlikely that airfield neighbors will remain outside their homes 24 hours per day for extended periods of time. Therefore, hearing loss below a DNL of 75 dB is highly unlikely, and this level is extremely conservative.



Source: FICAN, 1997.

### B.1.3.5 Nonauditory Health Effects

Nonauditory effects of long-term noise exposure, where noise may act as a risk factor, have never been found at levels below federal guidelines established to protect against hearing loss. Most studies attempting to clarify such health effects found that noise exposure levels established for hearing protection would also protect against nonauditory health effects (von Gierke, 1990). There are some studies in the literature that claim adverse effects at lower levels, but these results have generally not been reproducible.

Table B-1-2 is adapted from the *Federal Agency Review of Selected Airport Noise Analysis Issues* (FICON, 1992). The table is a general summary of the effects of noise on people based on scientific studies to date.

### B.1.3.6 Effects on Domestic Animals and Wildlife

In terms of noise effects on animals, aircraft noise may mask or interfere with the animals' ability to obtain food, avoid predators, and communicate with and attract other members of their species. Other effects may include nonauditory effects similar to those exhibited by humans – stress, hypertension, and other nervous disorders. Additional effects may include interference with mating and resultant population declines.

TABLE B-1-2

Effects of Noise on People (Residential Land Uses Only)

<b>Effects <sup>1</sup></b> <b>Day-Night Average Sound Level in Decibels</b>	<b>Hearing Loss</b>	<b>Annoyance <sup>2</sup></b>	<b>Average Community Reaction <sup>4</sup></b>	<b>General Community Attitude Towards Area</b>
	<b>Qualitative Description</b>	<b>% of Population Highly Annoyed <sup>3</sup></b>		
75 and above	May begin to occur	37%	Very severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will not be likely	22%	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will not occur	12%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will not occur	7%	Moderate to slight	Noise may be considered an adverse aspect of the community environment.
55 and below	Will not occur	3%		Noise considered no more important than various other environmental factors.

**Notes:**

<sup>1</sup>All data are drawn from National Academy of Science 1977 report "Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise."

<sup>2</sup>A summary measure of the general adverse reaction of people to living in noisy environments that cause speech interference; sleep disturbance; desire for tranquil environment; and the inability to use the telephone, radio or television satisfactorily.

<sup>3</sup>The percentages of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time. USAF Update with 400 points (Finogold et al. 1992).

<sup>4</sup>Attitudes or other non-acoustic factors can modify this. Noise at low-levels can still be an important problem, particularly when it intrudes into quiet environment.

Source: FICUN, 1980; FICON 1992 (Update)

Many scientific studies are available regarding the effects of noise on wildlife as well as some anecdotal reports of wildlife "flight" due to noise. Few of these studies or reports include any reliable measures of the actual noise levels involved. In the absence of definitive data on the effect of noise on animals, the Committee on Hearing, Bioacoustics, and Biomechanics of the National Research Council, has proposed that protective noise criteria for animals be taken to be the same as for humans (NRC, 1977). Acoustical communication is an integral component of social interactions among marine mammals. The known effects of noise on Arctic mammals are limited. Beluga whales are more easily displaced by boat traffic when feeding, and bowhead whales appear more wary of noise during spring compared to autumn (Manci et al., 1988).

## B.1.4 Study Methodology

### B.1.4.1 Study Approach

The accepted method for evaluation of aircraft noise exposure in the vicinity of military bases is the use of the USAF's NOISEMAP computer program. This noise model accounts for noise effects of military aircraft landings, takeoffs, and ground run-up operations based on an extensive database that has been developed from actual measurements. The use of NOISEMAP is an appropriate and accepted method for development of DNL contours to be used in land use compatibility planning studies, such as an AICUZ study, and for assessment of environmental noise impacts.

The operational data developed and used in the noise modeling process include:

- Number of average busy day operations by aircraft type
- Locations of aircraft flight tracks
- Level of use of each flight track
- Aircraft profile data such as power settings, speeds, and altitudes for each type of flight maneuver
- Aircraft run-up data in terms of the time of day and duration of maintenance activities, engine power settings, and aircraft heading at each run-up location

The proposed C-17 beddown would introduce eight new C-17 aircraft to the existing fleet at EAFB. The proposed action would also remove a total of 14 C-130H aircraft from the existing EAFB fleet and assign them to locations outside Alaska. To assess the potential noise impacts of the proposed action, data related to the existing operational conditions and noise exposure around EAFB were obtained from the staff at the Air Force Center for Environmental Excellence (AFCEE) who conducted a revalidation of EAFB's AICUZ study in April 2000. This information was used to represent the existing (baseline) noise conditions in the vicinity of the airfield. The anticipated levels of C-17 flight activity and types of operations conducted by the new C-17 aircraft were added to the baseline noise model and most flight activities by C-130H were removed from the baseline model to evaluate the resultant noise exposure after the introduction of the C-17 aircraft to the fleet at EAFB.

### B.1.4.2 Noise Model

The current version of NOISEMAP (Version 6.5) was used to develop the aircraft noise exposure maps for flight operations occurring at or in the vicinity of EAFB. Version 6.5 of NOISEMAP consists of its noise database NOISEFILE, and its related programs BASEOPS, OMEGA10, OMEGA11, NOISEMAP itself, and NMPLOT. NOISEFILE is a noise database for models of civilian and military aircraft. The BASEOPS program allows for entry of runway coordinates, airfield information, flight tracks, flight profiles (powers, altitudes, and speeds) along each track by each aircraft, numbers of flight operations, run-up coordinates, run-up profiles, and run-up operations. The Master Control Module (MCM) uses this information to generate noise level versus distance data specific to the given airfield

elevation, average temperature and humidity, aircraft types, power settings, and operations conducted at that airfield. The core NOISEMAP program, then incorporates the number of daytime (0700-2200) and nighttime (2200-0700) operations, flight paths and profiles of the aircraft to calculate the noise exposure (DNL) at many points on the ground.

The NOISEMAP computer program flies each aircraft along a flight track, using the power, speed, and altitude profiles defined for its takeoff, landing, or closed-loop pattern operation. This is accomplished by specifying the flight track and performance profiles. The flight track is a projection onto the ground plane of the three-dimensional flight path of the aircraft; the performance profile defines the performance characteristics of the aircraft in terms of altitude, speed, and power versus distance from the start of the takeoff roll. The noise levels of a specific aircraft (or class of aircraft) at a given thrust are defined as a generalized function of the slant distance between the aircraft and the observer. The path of the aircraft in space is defined in the input data set, so that the slant distance between the aircraft and the observer is known. The noise level versus distance data are used to determine SEL at a specific ground location for a single operation. The program computes the noise exposure from each aircraft flight at a grid of points on the ground. The DNL at a ground location resulting from aircraft flight operation is a function of the SELs produced by the individual aircraft, and the numbers of such aircraft operating during daytime and nighttime periods. The total aircraft flight noise exposure is the summation of the noise exposure from all operations of all aircraft on all flight paths.

The OMEGA10 program calculates the SELs for each model of aircraft, taking into consideration the specified speeds, engine thrust settings, and environmental conditions appropriate to each type of flight operation. The OMEGA11 program calculates maximum A-weighted sound levels for each model of aircraft taking into consideration the engine thrust settings and environmental conditions appropriate to run-up operations. The combined operational and noise data are used as input to the NMAP subprogram, which generates a grid of noise exposure values on the ground at the user-defined spacing, and specific points defined by the user. The NMPLOT program, then processes the grid values and draws contours of equal DNL for integration into Geographic Information System (GIS) or overlay onto land-use maps. Typically, DNL contours of 65 to 75 dB are developed for environmental studies.

## Existing Conditions

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### B.2.1 Description of Existing Facility

EAFB is roughly a triangular-shaped installation located in south-central Alaska, along Knik Arm, at the headwaters of Cook Inlet (latitude/longitude 61° 15'N/149° 18'W). EAFB comprises 13,130 acres and extends approximately 7.4 miles along the Knik Arm. It is bordered on the north and west by Cook Inlet, on the south by residential, industrial, and business districts of Anchorage, and on the east by Fort Richardson. Figure B-2-1 (page B-13) shows the location of EAFB and adjacent properties.

### B.2.2 Existing Land Use

EAFB is bounded on its west and north by the Knik Arm of the Cook Inlet. U.S. Army's Fort Richardson and its associated training ranges are east and northeast of EAFB. Existing land uses to the south of EAFB are a mix of industrial, commercial, residential, recreational/open space, and public land. Residential land uses are located in the communities of Government Hill, along the base's southwest boundary; in Mountain View, immediately south of Runway 33; and in Wonder Park, south of the base and southeast of Mountain View. Commercial properties are located along Glenn Highway, south of Runway 33. Industrial areas are concentrated along the Ship Creek/Alaska Railroad corridor and at the Port of Anchorage, south and west of the base.

### B.2.3 Meteorological Data

Monthly average temperature and relative humidity data at the EAFB area for the period between 1973 and 1996 were obtained from data provided by the AFCEE staff. Table B-2-1 summarizes the weather data. Since weather is an important factor in the propagation of noise, identifying the temperature and humidity conditions is critical to the accuracy of the final noise contours. NOISEMAP requires an average air absorption value to represent sound absorption on a "standard day." The air absorption coefficients for each month were determined using the atmospheric absorption coefficients chart shown in Figure B-2-2 (page B-15).

The average monthly temperature and relative humidity corresponding to the sixth smallest value (median) of absorption coefficient were used in the NOISEMAP model (Air Force Handbook 32-7084). The weather data used in the noise model are a mean temperature of 34 degrees Fahrenheit (°F) and a mean relative humidity (RH) of 72 percent.

**TABLE B-2-1**  
Monthly Weather Data, Elmendorf AFB, 1973-1996

Month	Mean Temp. (°F)	Mean RH (%)	Atmospheric Absorption (dB/1000 ft.)
January	16	75.0	3.0
February	17	69.5	3.1
March	26	64.0	2.5
April	36	62.5	1.8
May	47	60.5	1.5
June	55	63.5	1.43
July	59	70.0	1.47
August	57	72.5	1.45
September	48	71.5	1.36
October	34	72.0	1.7
November	21	77.0	2.5
December	16	78.5	2.9

Note: The highlighting indicates that data from October were used because October had the median value for atmospheric absorption.

## B.2.4 Existing Aircraft Flight Operations

In order to determine the level of aircraft noise exposure in areas around EAFB, detailed operational information about the facility is needed. Such information was developed from a rigorous interview process with the EAFB air traffic control and maintenance personnel and pilots during the base AICUZ Revalidation conducted in April 2000.

Aircraft currently utilizing the airfield at EAFB include based, transient, and special exercises aircraft. There are a total of 42 F-15C aircraft based at EAFB. Of those, 18 are assigned to 19th Fighter Squadron (FS) and 54th FS operates 24 of these aircraft. The annual sorties flown by 19th FS include 50 Operational Mission sorties, and 2,846 Air-to-Air sorties. The 19th FS flies 250 days per year. The 54th FS flies 240 days per year, with 50 Operational Mission sorties and 3,726 Air-to-Air sorties. Combined numbers of F-15C sorties at EAFB are 25.24 sorties per average busy day.

Eighteen F-15E aircraft are assigned to 90th FS at EAFB. The squadron averages 310 sorties per month and flies an average of 227 days per year. Per year, the number of sorties flown by 90th FS includes 936 Air-to-Air sorties, 2,664 Surface Attack (air-to-ground) sorties, 72 instrument sorties, and 48 other types of sorties.



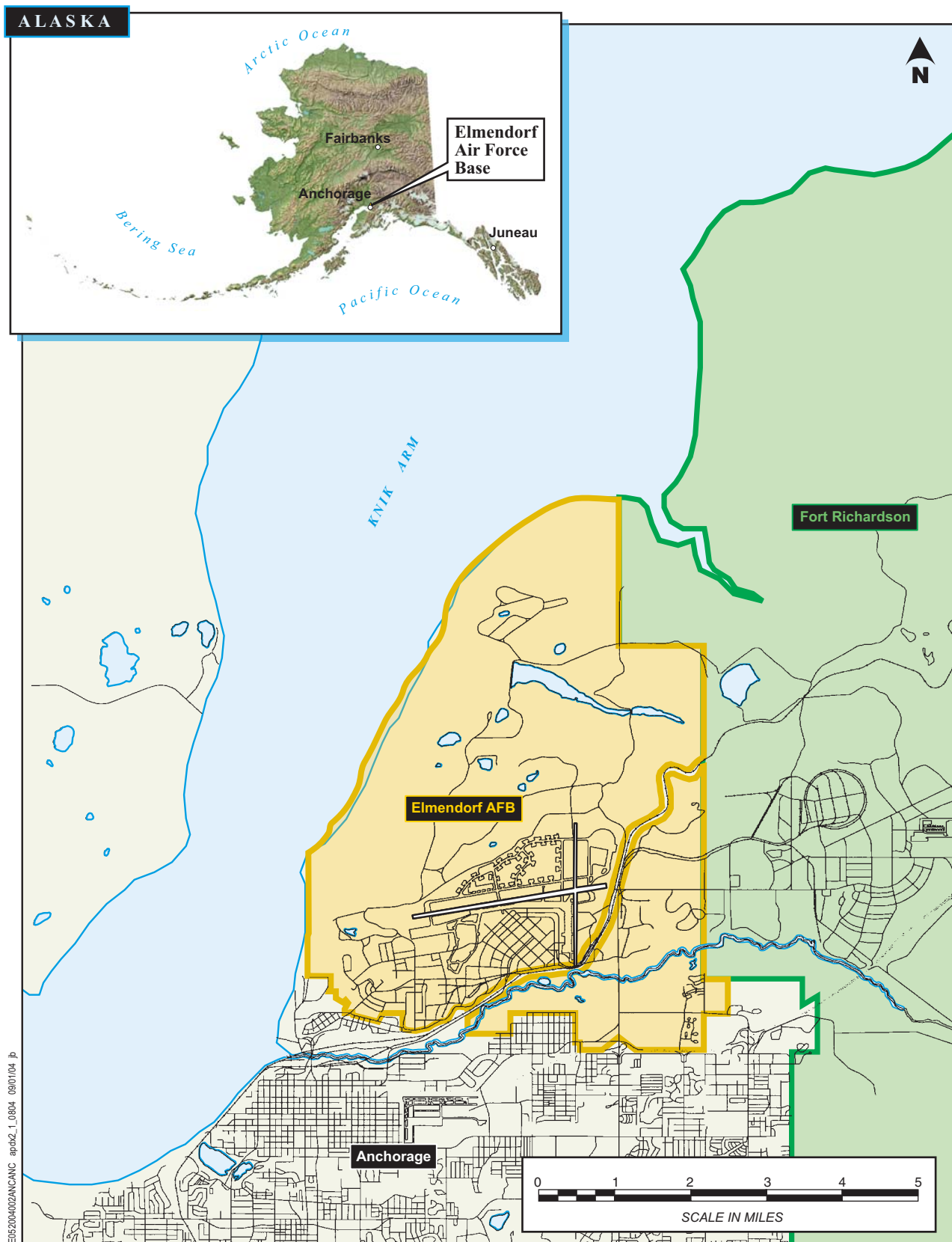
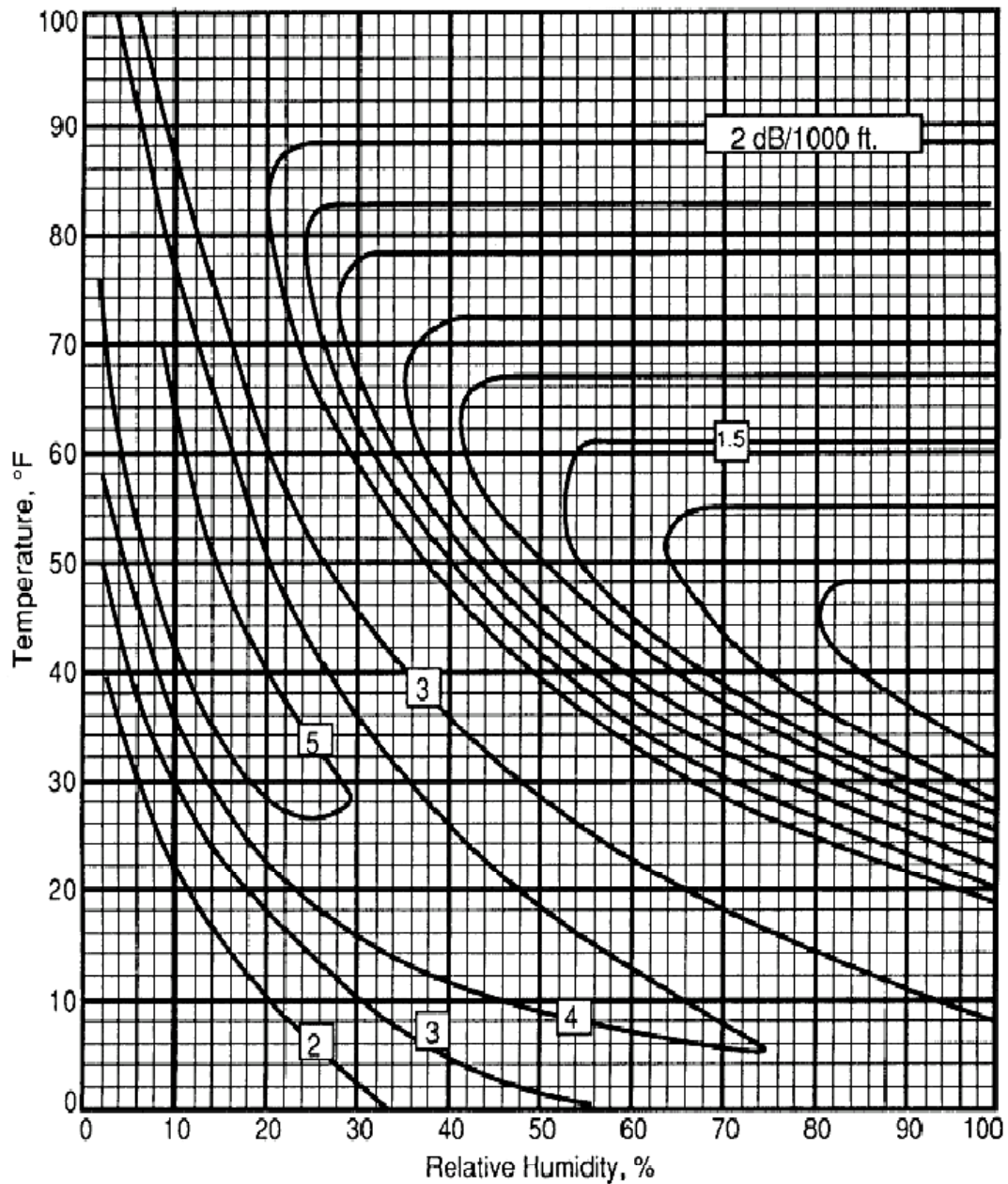


Figure B-2-1  
**Elmendorf Air Force Base and Vicinity**  
C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska

FIGURE B-2-2

Atmospheric Absorption as a Function of Temperature and Relative Humidity in dB per 1000 feet—at 1000 HZ Frequency



Source: NAS, 1997

The 517th Airlift Squadron (517 AS) uses two C-12F and one C-12J aircraft. The squadron averages 28 mission sorties and 12 transition sorties per month. This number does NOT include sorties flown when deployed. The squadron flies its C-12 aircraft 280 days per year.

Eighteen C-130H aircraft are also assigned to 517 AS at EAFB. The C-130H sorties flown at EAFB include 950 Low-level Tactical Mission sorties per year, 550 Channel sorties per year, and 400 Local Proficiency sorties per year. C-130H aircraft are flown 250 days per year.

The 962nd Airborne Air Control Squadron (AACS) operates two E-3 aircraft at EAFB. The squadron averages 12 mission sorties per month and 4 proficiency sorties per month. On average, the 962nd AACS flies its aircraft 16 days per month or 192 days per year.

The US Army has two UC-35 aircraft assigned to Alaska Regional Flight Center. The UC-35 is a Cessna Citation V Ultra with two Pratt & Whitney JT15D-5D engines, similar to the C-21 Lear Jet. The squadron averages 20 mission sorties per week and flies 260 days per year.

The Aero Club at EAFB owns 10 aircraft. The fleet consist of two Cessna 152 (C-152), six Cessna 172 (C-172), one Cessna 206 (C-206), and one Piper Seneca (PA-34T) aircraft. Except for the Piper Seneca which is a twin engine aircraft, all are single engine aircraft. These aircraft typically fly a total of about 51 sorties per week. Of these 51 sorties, two are flown using the PA-34T. The Aero Club aircraft fly 7 days per week, however, they seldom fly between 2200-0700 hours.

Table B-2-2 summarizes the existing (Year 2000) flight activities on an average busy day basis and Table B-2-3 shows the operational split between daytime and nighttime periods by type of aircraft flights.

TABLE B-2-2 Existing (2000) Aircraft Flight Operation, Elmendorf Air Force Base					
Aircraft Type	Flying Days per Year	Operations per Day			Total Daily Operations
		Departures	Arrivals	Closed Patterns	
Based Aircraft Operations					
F-15C	250	25.24	25.24	2.87	52.22
F-15E	227	16.39	16.39	16.71	66.20
C-130H	250	17.40	17.40	65.95	166.70
C-12	280	1.20	1.20	5.14	12.68
UC-35	260	4.00	4.00	0	8.00
E-3	192	1.00	1.00	5.75	13.50
Aero Club	365	7.30	7.30	1.33	17.26
Transient Aircraft Operations					
A-10	365	0.10	0.10	0	0.20
C-5	365	0.59	0.59	0	1.18
C-9	365	0.22	0.22	0	0.44
KC-10	365	0.17	0.17	0	0.34
C-12	365	0.50	0.50	0	1.00
C-17	365	0.67	0.67	0	1.34
C-20	365	0.20	0.20	0	0.40
C-23	365	0.18	0.18	0	0.36

**TABLE B-2-2**  
Existing (2000) Aircraft Flight Operation, Elmendorf Air Force Base

Aircraft Type	Flying Days per Year	Operations per Day			Total Daily Operations
		Departures	Arrivals	Closed Patterns	
C-130	365	1.90	1.90	0	3.80
KC-135	365	0.40	0.40	0	0.80
C-141	365	0.13	0.13	0	0.26
F-15	365	0.28	0.28	0	0.56
F-16	365	0.16	0.16	0	0.32
P-3	365	0.35	0.35	0	0.70
B-707	365	0.15	0.15	0	0.30
LearJet 35	365	0.41	0.41	0	0.82
Single-engine GA	365	0.05	0.05	0	0.10
<b>Special Exercises Aircraft Operations</b>					
B-52	260	0.11	0.11	0	0.22
C-20	260	0.12	0.12	0	0.24
C-130	260	0.85	0.85	0	1.70
E-3	260	0.03	0.03	0	0.06
F-16	260	0.715	0.715	0	1.43
F-18	260	1.23	1.23	0	2.46
P-3	260	0.04	0.04	0	0.08
S-3	260	0.20	0.20	0	0.40

Source: AFCEE, 2002

**TABLE B-2-3**  
Percentage of Day/Night Operations by Type of Flight

Aircraft Type	Departures		Arrivals		Closed Patterns	
	Day	Night	Day	Night	Day	Night
F-15C	96.7%	3.3%	97.0%	3.0%	100%	0
F-15E	93.5%	6.5%	93.3%	6.7%	100%	0
C-130H	94.5%	5.5%	97.3%	2.7%	95.3%	4.7%
C-12	96.7%	3.3%	99.2%	0.8%	100%	0
UC-35	96.0%	4.0%	100%	0	---	---
E-3	93.0%	7.0%	93.0%	7%	100%	0
Aero Club	100%	0	100%	0	100%	0

Source: AFCEE, 2002

Aircraft runway utilization and flight tracks determine the shape of noise exposure contours and areas on the ground where aircraft noise levels are highest. The majority of aircraft flights at EAFB occur on Runway 06 regardless of the type of operation. Most departures at the airfield assume a northerly direction right after takeoff. Table B-2-4 is a summary of runway utilization by the based aircraft at EAFB.

TABLE B-2-4 Based Aircraft Runway Percent Utilization, Elmendorf Air Force Base												
Aircraft Type	Departures				Arrivals				Closed Patterns			
	Rwy 06	Rwy 24	Rwy 34	Rwy 16	Rwy 06	Rwy 24	Rwy 34	Rwy 16	Rwy 06	Rwy 24	Rwy 34	Rwy 16
F-15C	90.0	5.0	5.0	0.0	92.0	4.0	4.0	0.0	95.0	0.0	5.0	0.0
F-15E	90.0	8.0	2.0	0.0	95.7	2.6	1.7	0.0	98.6	0.0	1.4	0.0
C-130H	99.9	0.1	0.0	0.0	99.4	0.6	0.0	0.0	62.4	0.0	18.2	19.4
C-12	99.7	0.1	0.1	0.1	99.7	0.1	0.1	0.1	85.0	0.0	15.0	0.0
UC-35	90.0	10.0	0.0	0.0	95.0	5.0	0.0	0.0	NA	NA	NA	NA
E-3	73.0	25.0	2.0	0.0	73.0	27.0	0.0	0.0	73.0	27.0	0.0	0.0
Aero Club	90.0	5.0	3.0	2.0	90.0	5.0	3.0	2.0	100.0	0.0	0.0	0.0
Source: AFCEE NA = not applicable												

The aircraft flight tracks used in the NOISEMAP model for EAFB were developed from AFCEE interviews with air traffic control personnel and pilots. Generalized aircraft flight tracks used in the noise model are shown by Figure B-2-3 (page B-19).

## B.2.5 Existing Noise Environment

Surface and air transportation vehicles are the main sources of environmental noise affecting the vicinity of EAFB and the Anchorage area in general. Besides military aircraft activity at EAFB, commercial and general aviation aircraft flights at the Ted Stevens Anchorage International Airport and, to a lesser extent, at Merrill Field result in exposure of local residents to aircraft noise. Vehicular traffic on Glenn Highway, extending near the southeast boundary of EAFB, is also a major source of noise within areas located along the roadway. In April 2000, AFCEE staff conducted a revalidation of EAFB's AICUZ study. Figure B-3-2 (page B-25) depicts the DNL 65 dB, 70 dB, and 75 dB contours resulting from that study. Land areas exposed to military aircraft noise levels of DNL 65 dB or higher are confined to areas within the EAFB, Fort Richardson, and over the Knik Arm of the Cook Inlet. Only a very small portion of off-base land in north Anchorage is exposed to noise levels near DNL 65 dB. All of the off-base area impacted by noise levels exceeding DNL 65 dB is over water in the Knik Arm of the Cook Inlet.

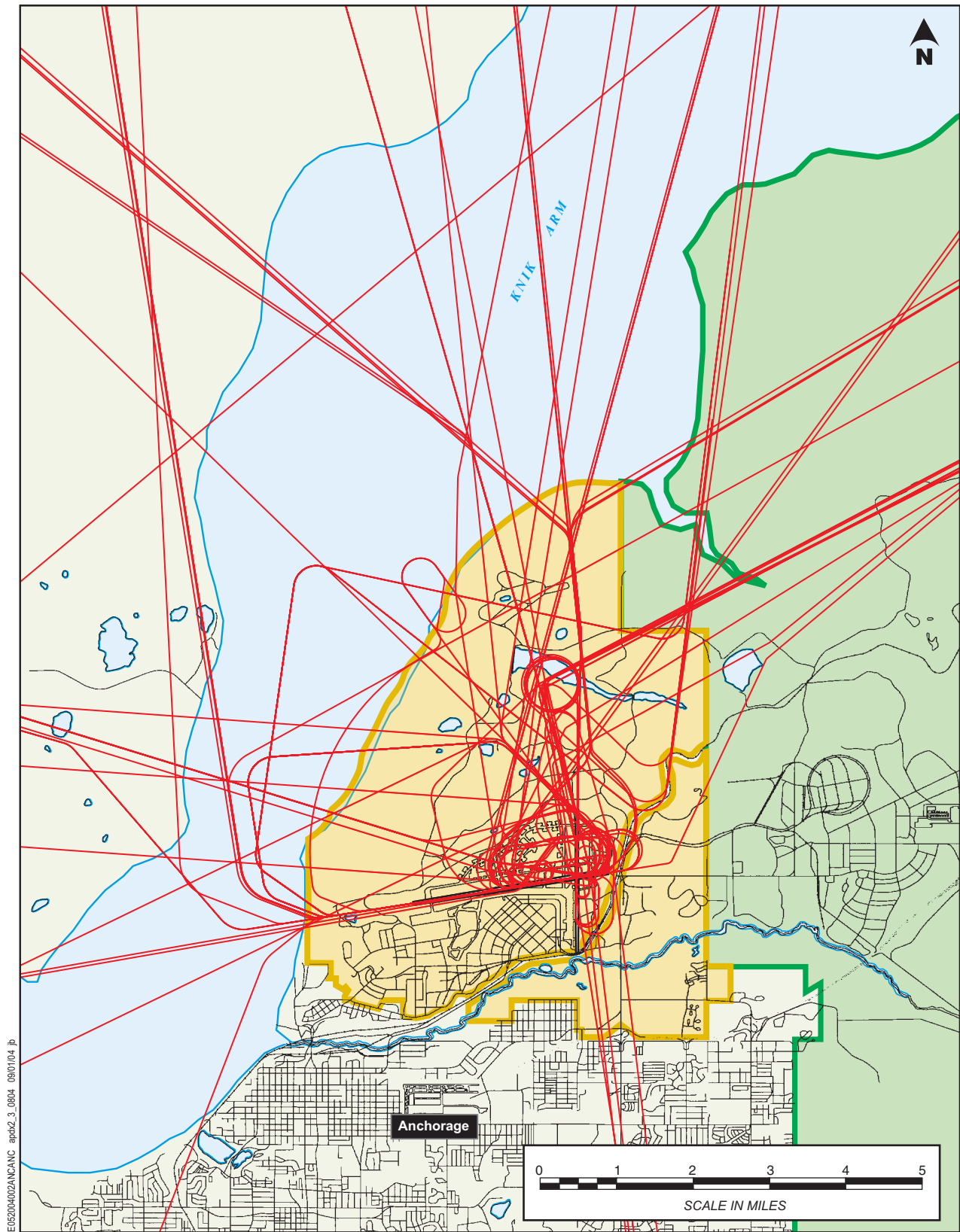


Figure B-2-3  
**Existing (2000) Flight Tracks**  
C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska

## SECTION B.3

# Environmental Consequences

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The proposed C-17 beddown would introduce eight new C-17 aircraft to the existing aircraft fleet at EAFB. The proposed action would also reassign 14 of the 18 C-130H cargo aircraft currently operating at EAFB to military installations outside Alaska.

The following sections summarize the C-17 flight operations assumptions and results of the noise evaluation for the proposed action.

## B.3.1 C-17 Flight Operations

In order to assess the potential noise impacts of the proposed C-17 beddown at EAFB, aircraft operational data in terms of aircraft flight tracks, flight profiles and runup activities were developed based on information provided by the C-17 Program Integration Office.

Consistent with the existing runway utilization by other aircraft at EAFB, it has been assumed that the new C-17 aircraft would predominantly use Runway 06 for their operations. C-17 performance data provided by the C-17 Program Integration Office were used in developing the aircraft flight profiles for departures, arrivals, and flights along closed patterns. Figure B-3-1 (page B-23) depicts the generalized C-17 flight tracks used in the NOISEMAP program for the proposed action.

In terms of aircraft runup activities conducted for maintenance purposes, the C-17 aircraft will be towed to the proposed hangars/aprons to be constructed near the flight line and run up with the following times at the indicated power settings:

- Takeoff (100%) = 4 minutes (Afterburner setting)
- Climbout (70%) = 8 minutes (Military setting)
- Approach (50%) = 10 minutes (Intermediate setting)
- Idle (30%) = 15 minutes

## B.3.2 No Action Alternative

If the C-17 aircraft are not assigned to EAFB, noise exposure around the base will continue to remain at existing levels (Figure B-3-2, page B-25). Military aircraft noise exposure levels of DNL 65 dB or higher would continue to be primarily confined to areas within the EAFB and Fort Richardson. Only a very small portion within north Anchorage, near the EAFB boundary, would be exposed to noise levels near DNL 65 dB.

## B.3.3 Proposed Action

Under the proposed action, C-17 aircraft operations will occur in the vicinity of EAFB. C-17 aircraft will conduct roughly 4,000 annual operations at EAFB. Most of the operations will be mission- and training-related exercises (e.g., touch and go operations at EAFB and radar

site resupply missions). The C-17 aircraft are expected to be conducting missions abroad with approximately 80 percent of the allocated flight hours.

Since it is assumed that the C-17 aircraft will not operate on weekends and holidays, the number of active flight days for the aircraft has been assumed to be 250 days per year. Based on 4,000 total annual flight operations and 250 days of activity, 16 C-17 operations would occur at the airfield on an average busy day. Of these, 90 percent (or 14.4 daily operations) would be takeoffs and landings and the remaining 10 percent would be touch-and-go operations. For a conservative assessment of noise impacts, 90 percent of C-17 operations has been allocated to daytime (0700 to 2200) hours and 10 percent to nighttime (2200 to 0700) hours. This day/night breakdown is more conservative than that by the existing aircraft at EAFB (Table B-2-3).

There will be an estimated 743 runups of C-17 aircraft per year as a result of the project. For the purpose of the noise analysis, it is assumed that three runups would occur on an average busy day.

Furthermore, the total operations by C-130H aircraft would reduce from 8,700 annual landings and takeoffs to 1,800 arrivals and departures per year. The number of C-130H touch-and-go flights and maintenance runups would also decrease proportionally.

Figure B-3-2 (page B-25) depicts the 65 dB, 70 dB, and 75 dB DNL contours after the addition of the C-17 flight operations and reduction of the C-130H aircraft that would take place under the proposed action.

### **B.3.4 Evaluation of Potential Noise Impacts**

A comparison of the project noise contours to those under the No Action alternative, as indicated by Figure B-3-2 (page B-25), reveals that slight decreases in overall aircraft noise exposure would occur as a result of the introduction of C-17 aircraft and the reduction of C-130H operations at EAFB. Such decreases in land areas impacted by noise levels of DNL 65 dB or above would be insignificant and confined to areas within the EAFB and Fort Richardson properties. Table B-3-1 is a summary of overall land areas within the three contour bands of DNL 65-70 dB, 70-75 dB, and 75 dB or above. It is not anticipated that off-base noise-sensitive areas such as the residential areas south of EAFB will be adversely affected by changes in noise levels resulting from the proposed action.

Under the proposed action (Figure B-3-2, page B-25), changes in areas exposed to noise levels of DNL 65 dB or above would take place in areas along the C-17 and C-130H flight tracks departing from Runway 06. Most of the DNL 65 dB area would be within EAFB property. However, some new off-base water areas within Knik Arm, north of EAFB, may be exposed to DNL 65 dB. No off-base lands are expected to be significantly affected by noise level changes under the proposed action.

Beluga whales are the main wildlife species of concern potentially affected by noise associated with the proposed C-17 beddown at EAFB. Beluga whales are often observed beneath approach corridors for Anchorage International Airport, Merrill Field, and Elmendorf AFB. The proposed F-22 Beddown Draft Environmental Impact Statement (EIS) concludes that noise exposure levels would not be expected to affect these whales. Since the



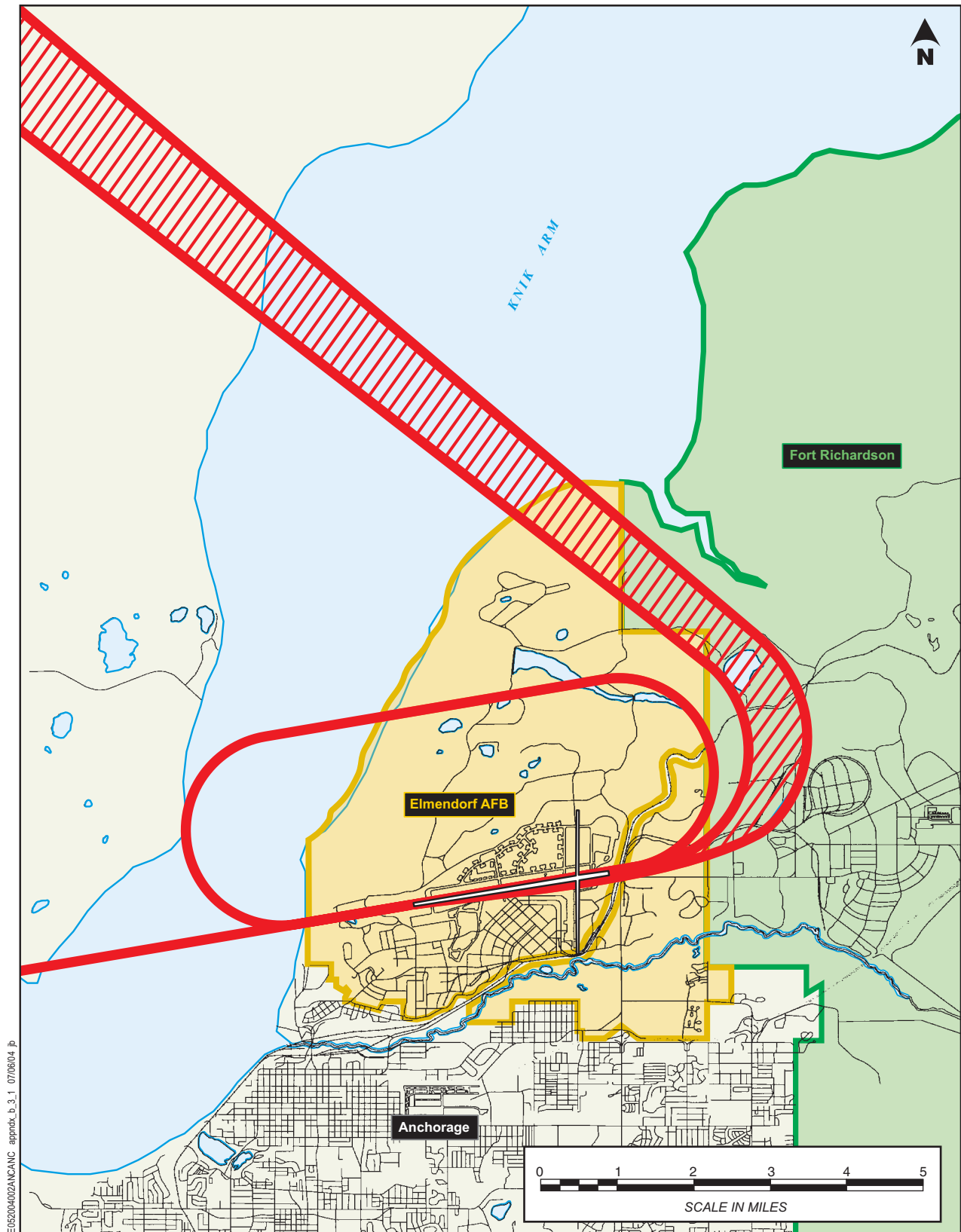


Figure B-3-1  
**Generalized C-17 Flight Tracks**  
C-17 Beddown Environmental Assessment  
Elmendorf Air Force Base, Alaska

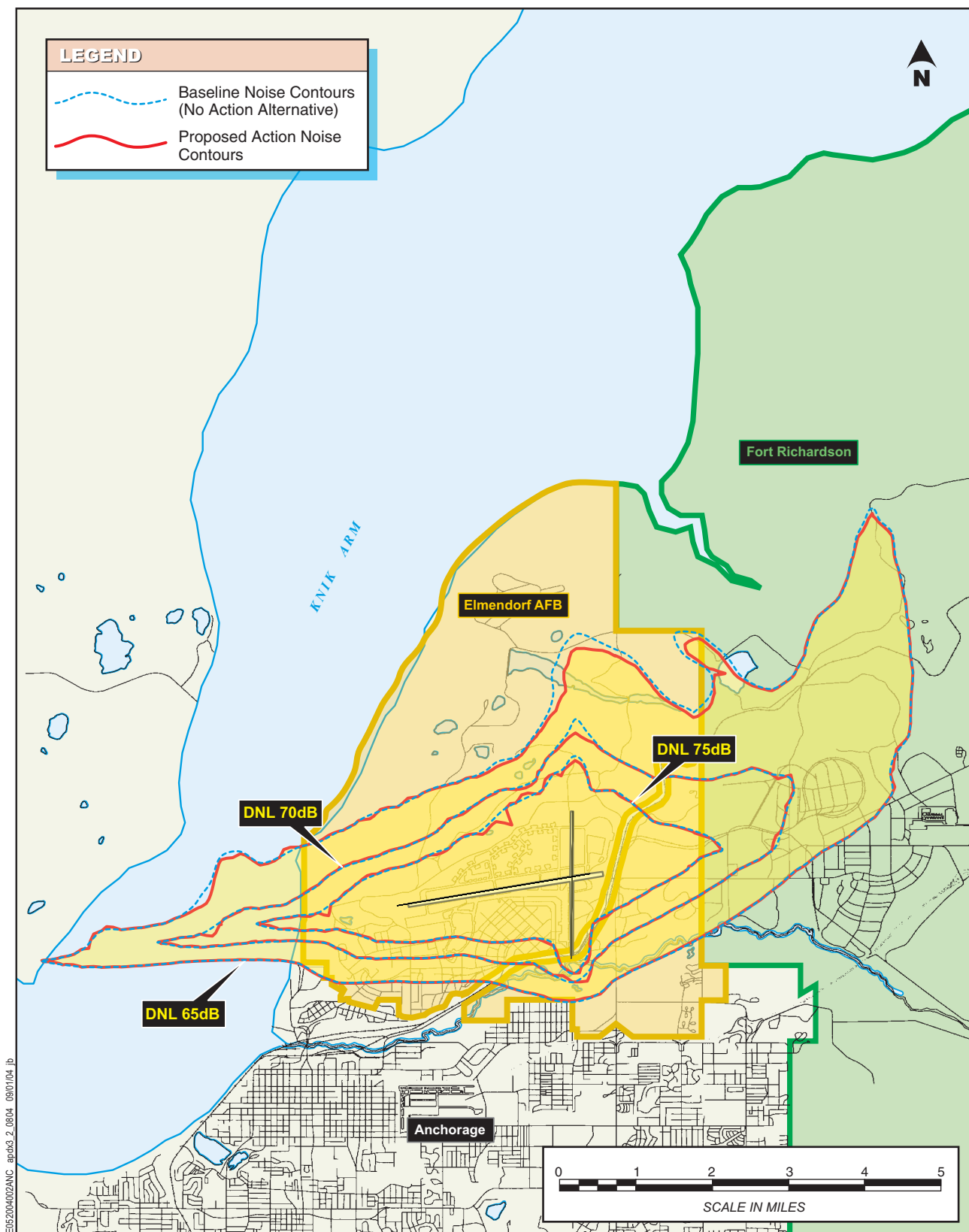


Figure B-3-2  
**Day-Night-Average Noise Level (DNL) Contours**  
 C-17 Beddown Environmental Assessment  
 Elmendorf Air Force Base, Alaska

TABLE B-3-1

Comparison of Noise Contour Areas of Proposed Action to No Action

DNL (dB)	Land Area, acres		Percent Change Relative to No Action
	No Action (Alternative 1)	Proposed Action	
65-70	5352.8	5185.5	-3.1%
70-75	1864.8	1854.9	-0.5%
75 or above	2302.3	2284.6	-0.8%
Source: AFCEE, 2002			

C-17 aircraft do not create sonic booms and result in only slight increases in DNL exposure near the base and over water, the proposed C-17 beddown is not expected to result in any adverse effects on the whales either.

### B.3.5 Cumulative Effects

In terms of cumulative impacts, the major potential future action at EAFB considered together with the proposed C-17 beddown is the initial F-22 Operational Wing Beddown. Under the proposed F-22 action, the existing F-15C fleet assigned to EAFB would be replaced by F-22 aircraft. The draft EIS prepared for the proposed F-22 beddown shows increases in aircraft noise exposure around EAFB that are much larger than those anticipated to result from the C-17 action. Since the addition of C-17 flight and ground operations would result in very slight decreases in the size of existing noise contours, it can be concluded that the cumulative effect of both actions would be similar to the noise effects of the proposed F-22 action. The F-22 draft EIS concludes that there would not be any noise exposure above DNL 65 at off-base noise sensitive land areas. All areas exposed to DNL 65 or higher would be confined to lands within EAFB and Fort Richardson and water areas within the Knik Arm of Cook Inlet.

## SECTION B.4

# References

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